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THE EUROPEAN CUCKOO AND THE COWBIRD

By EDGAR P. CHANCE and HARRY W. HANN*

RECENT discoveries and publications concerning the European Cuckoo (*Cuculus canorus canorus*) (Chance, 1922 and 1940) and the Eastern Cowbird (*Molothrus ater ater*) (Hann, 1937 and 1941) have encouraged the writers to set forth some comparisons between these two parasitic forms. The species are not closely related and their habits furnish a good example of parallel development, though in different degrees of specialization. Other species of cuckoos in the Old World and also other cowbirds in the Americas are parasitic, but in general are not well known. The Yellow-billed Cuckoo (*Coccyzus americanus*) and the Black-billed Cuckoo (*Coccyzus erythropthalmus*) of America, which are closely related to the European Cuckoo and which might be expected to be parasitic, build their own nests and are said to lay eggs only occasionally in the nests of other birds.

The European Cuckoo and the Cowbird have certain specialized traits in common, and each has traits of its own, but in general the Cuckoo is much more highly specialized than the Cowbird. Each species is able (1) to correlate its laying with the laying time of the host, (2) to replace an egg of the host with one of its own, and (3) to reduce the time required at the nest to a matter of seconds, thereby causing a minimum of disturbance to the host.

The Cuckoo, among its special traits, has a strong tendency to be host-specific, that is, each female tends to lay her eggs in the nests of one selected species. This inclination in turn accounts for a similarity between the eggs of many individual Cuckoos and those of their hosts. This specificity of hosts presupposes the mating of males and females of like foster parentage, since the male as well as the female is commonly believed to influence the type of egg laid by the daughter (See Chance, 1940, pp. 203–207 for discussion by R. C. Punnett). The type of egg laid by each individual female is fixed for life, and is not within the control of the bird herself. Rey (1892) first noticed the resemblance of eggs laid in a given territory and correctly assumed that they were the product of a

*Material from the second author is a contribution from the Department of Zoology, University of Michigan.

single female. Later Chance's discoveries were made possible by the fact that he could recognize the eggs of each female Cuckoo by their constant and distinctive markings, when he found them in the nest. Chance also was able to follow the Cuckoo by sight as she watched the nests and went to lay, and even to furnish nests in which to lay by previously collecting the nests of the hosts, thus causing them to build new ones at the proper time. This "management" of nests was an arduous task, but it enabled him to witness many layings and finally to have a photographer present in a blind to take moving pictures of the laying. As far as it is yet known there is no tendency for the Cowbird to be host-specific, and no particular similarity has developed between its eggs and those of the host.

The manner and time of laying and also the method of taking eggs of the host differ in the two species. The female Cuckoo usually takes an egg of the host at the time of laying her own. She grasps the egg in her beak without piercing it and holds it there while laying, then flies away with it. She of necessity sits *on* or *over* the nest rather than *in* it while laying, on account of her size, for she regularly parasitizes birds much smaller than herself. Chance made most of his observations at the nest of the Meadow Pipit, which is placed on the ground and often is well concealed. Here the Cuckoo seizes the egg nearest to her then merely moves forward over the nest and deposits her own egg in its place. She lays in the afternoon, and only on alternate days as was correctly guessed by Rey (1892). It requires only about eight seconds for her to deposit her egg, though the time varies somewhat, and as a rule she lays but a single egg in a nest. Under Chance's management a Cuckoo laid twenty-five eggs in one season from May 11 to June 29, but the normal number is probably less than half of that. Female Cuckoos appear to be more prolific after their first season. Nine years is the longest known life of a laying Cuckoo, but few live so long.

The Cowbird, as opposed to the Cuckoo, makes separate visits for the laying and taking of eggs. Hann observed the female Cowbird coming to the Oven-bird's nest to lay on eight different occasions, which varied in time from seventeen to twenty-seven minutes (average, twenty-two minutes) before sunrise. This is the approximate time of day when Cowbirds regularly lay, unless there are different races of Cowbirds, or different behavior with different hosts, neither of which is likely. The Cowbird *enters* the nest of the Oven-bird to lay and sits sidewise while laying, remaining from a few seconds up to a minute, then flies directly from the nest. (See photographs, Hann, 1941.)

Two or more Cowbirds' eggs often are found in the same nest, and as many as seven have been found in a single nest of an Oven-

bird (Hess, 1910, p. 26). More than one female may be involved in multiple layings, but certainly in many cases a single female will lay more than one egg in a nest. Friedmann (1929, p. 183) believed that female Cowbirds under his observation laid four or five eggs on consecutive days, and Mrs. Nice (1937, p. 155) found evidence that eggs were laid in three sets during the season with intervals of from six to twelve days between sets. More exact information on these points awaits further work.

The female Cowbird usually takes an egg of the host for each one of her own laid, but seems to restrict the taking of eggs to nests where two or more eggs are present. She makes a separate visit for this, either during the forenoon of the day before laying, during the forenoon following the laying in the morning, or rarely in the forenoon of the following day. She approaches the nest stealthily, pierces the egg in two places with her open beak and flies away with it. The taking of an egg of the Oven-bird was photographed by Hann (1941), and the removal of eggs of other species has been witnessed by different observers (Burroughs, 1887, p. 30) (Nice, 1937, p. 157). The eggs, at least in some cases, are eaten by the Cowbird.

In the young Cuckoo there is likewise a greater degree of specialization than in the young Cowbird. The Cuckoo, within thirty-six hours after hatching and before it has its eyes open, works itself under each of the other occupants of the nest and one by one ejects them over the side. The habit of laying a single egg in a nest is properly attuned to the habit of ejection, for if two or more Cuckoos were hatched in a nest, all but one ordinarily would be destroyed.

The young Cowbird does not eject other occupants of the nest, though sometimes its mere bulk may crowd them out. It may starve the rightful occupants by taking all the food, but this seems to depend somewhat on the habit of the parent birds in passing the food around. If the parents give all of the food to the young birds that reach the highest and call the loudest, the rightful occupants will fare badly. The Oven-birds regularly rear all of the young that hatch, including the Cowbirds; Song Sparrows usually will rear one Cowbird without the loss of their own young (Nice, 1933, p. 129); but other species, such as the Magnolia Warbler and Chipping Sparrow, perhaps as a rule lose all of their own brood and rear only the Cowbirds (Herrick, 1905, p. 222).

If the same methods could be applied to the Cowbird which Chance applied to the Cuckoo we should be able to discover a number of points which are now unknown or imperfectly known. Among these are (1) the area over which a Cowbird lays, (2) whether there is a tendency toward host specificity, (3) the number of eggs laid in a season, (4) the frequency of laying, and (5) the

circumstances under which more than one egg is laid in a nest by the same Cowbird. Friedmann and Nice have made a good start in studying egg patterns of the Cowbird, but it will take long and careful work to carry this task and its related problems through to completion. The difficulty here is much greater than in the case of the Cuckoo, since egg patterns are not as divergent, yet perhaps they are different enough that they usually can be distinguished. Moreover the Cowbird does not appear to be host-specific.

SUMMARY AND CONCLUSIONS

The European Cuckoo and the Cowbird of North America are outstanding parasitic forms, each in its own continent. Cuckoos and Cowbirds are not closely related and the habit evidently developed in each group independently. The Cuckoo is more highly specialized (1) in having individuals or races which parasitize particular species, (2) in laying eggs similar to those of the host, (3) in taking an egg at the time of laying, (4) in grasping the egg without piercing it, (5) in laying a single egg in a nest, and (6) in the young bird ejecting all other occupants from the nest. The Cowbird's (1) laying in early morning and its (2) refraining from taking an egg unless there are at least two in the nest may be considered specialized traits of its own. Both species are able (1) to correlate their laying with the laying time of the host, (2) to replace an egg of the host with one of their own, and (3) to reduce the time required at the nest to a minimum, thereby causing less disturbance to the host. If the methods used by Chance could be applied to the study of the Cowbird, much progress would be made, but the task of studying a species which is neither host-specific nor so strongly individualistic in its egg types is much greater than in the case of the Cuckoo. On the other hand Chance is of the opinion that the Cowbird is very much more abundant than the European Cuckoo.

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Kent Court Summit, New Jersey (temporary). Gurdons, Witley, Surrey, England (home).

Ann Arbor, Michigan.

AN IMPROVED METHOD OF DETERMINING BAND NUMBERS ON ILLEGIBLE BANDS

By FREDERICK E. LUDWIG

MANY of the banders who have been doing work with ducks, geese and shore birds have found that the bands, after a number of years, become so worn that they are illegible. Some of the banders find large numbers of these illegible bands during any one season. In October 1941 Mr. E. A. McIlhenny* mentioned some of these bands which were taken during the winter of 1941. I contacted Mr. McIlhenny asking him for some of these illegible bands upon which to experiment in an effort to determine band numbers.

Any bird bander resents not being able to determine the band numbers on his bands. When he can not complete the story of the bird a sense of futility hardly compensates for the hard work expended in trapping and banding these birds. With that in mind I began my experimentations by using first, ultra violet light. Certain digits on these old bands were brought out more clearly by the ultra violet light, but this method failed to bring out the exceptionally worn parts of the band, and was discarded as of little use in the final picture.

The next method attempted was the use of x-ray. I found that the alloy in the band was sufficient to make the entire band opaque to the x-ray. This method was not successful, and did not help in any degree to check additional digits on these bands.

The third and final method used was that of a slowly eroding solution which will attack the aluminum band as well as the copper band. The solution used by Mr. McIlhenny was that of an acid bath which was exceedingly strong. The principle of the two solutions is identically the same, that of erosion of the metal leaving the numbers exposed because of the compression of the molecules due to the stamping of the band. A slower eroding solution brings the numerals out after two or three applications, whereas the

*E. A. McIlhenny, *Bird Banding*, 12, No. 4: 168.

stronger acid solution erodes the numerals and the rest of the band so rapidly that you may miss the numbers when they become apparent.

The solution advised here is the use of the following formula.

½ oz. of Cupric Chloride
1 oz. of Methyl Alcohol
1 oz. of Distilled Water
1 oz. of Hydro-chloric Acid, U. S. P.

To mix this solution: dissolve the cupric chloride in the distilled water, and then add the methyl alcohol very slowly to the solution. After the cupric chloride is entirely dissolved, very slowly add the one ounce of U. S. P. hydro-chloric acid. This causes quite a violent reaction with the formation of fumes, and should be done in some glass receptacle. A large amount of heat is generated, and the addition of the hydro-chloric acid should be done very slowly. The solution may be stored in any rubber stoppered bottle.

Now that the solution is made, take a three-sixteenths inch glass tube about eight or ten inches long. With the glass tube as a dropper pick up one or two drops of the solution and apply it to the side of the band upon which the number was implanted. After a few seconds the solution will begin to foam and will form a reddish-black precipitate on top of the band. As soon as the boiling has stopped wash off the band with cold water and then very lightly rub your finger over the face of the band. Some of the black precipitate will stick to the numbers and thereby help to make them more legible. It has been my experience that three to six applications of one or two drops each of the solution with a washing in between each application usually brings out the band number. A little experience will show you the best period of time to leave the solution on the band. Always feel free to wash off the solution before it has completed its boiling if you think that it will erode the band too far. You can always add additional solution if you have not brought out the band number sufficiently.

It is a good idea to use a pair of rat-toothed forceps to hold the band. Do not allow the solution to get on your fingers until after the boiling has ceased. When that has occurred the large portion of the acid has been used up. If you do not have rat-toothed forceps an old surgical hemostat with which to grip the band is excellent. With such an instrument it is easy to wash the band and reapply additional solution without burning your hands or spotting your clothing.

I have found it very efficacious to use the solution on a piece of old window glass and also to keep all materials on that glass. This was done so that erosion of tables or porcelain sinks could be avoided

I have found that this method will help determine about ninety-five percent of the band numbers on all of these eroded bands. This should be exceedingly valuable in the work with water fowl.

Port Huron, Michigan.

RECOVERIES FROM MIGRATING BRONZED GRACKLES*

By EDWIN A. MASON

FUNDAMENTAL factors governing bird movements were operative in the spring of 1939 in an usual degree. The most striking result observed along the eastern seaboard was the eruptive invasion of the Eastern Purple Finch (*Carpodacus p. purpureus*), over ten thousand of which were banded. The records obtained were summarized by Weaver (1940), the indication being that the movement may have originated to the south and west of the region invaded, but that there was a trend to the east and south, especially in the early stages, with a returning northerly trend later. During this same period several other species were noted as being present in the area in unusually large numbers. Included were the Common Redpoll (*Acanthis l. linaria*) and the Pine Siskin (*Spinus p. pinus*). At the Wharton Bird Banding Station at Groton, Massachusetts, besides the species just mentioned, there was an unusual visitation of a flock of Bronzed Grackles (*Quiscalus quiscula aeneus*).

The most logical explanation for the presence of this flock of Grackles would seem to be that it had begun its northerly migration, having reached here from a region to the south. The presence of such a flock in the vicinity of the station of itself was not unusual. What was remarkable was the length of time it remained and its ready acceptance of grain bait. Spring flocks of grackles normally range widely over fields and lawns for food. In the spring of 1939, late heavy snows, possibly coupled with other less obvious climatic vagaries, were very likely responsible for the flock staying in the area and turning to grains for food to a greater degree than usual. Snow covered much of the countryside when the flock arrived, making suitable feeding areas at a premium. Thus the flock was attracted to areas in an orchard where the snow had melted in the shade of the apple trees, exposing buckwheat seed that had scattered from the cover crop sown between the rows of trees the previous autumn. As shown by the banding records, the flock remained from April 5 until towards the end of the month. During the latter part of the period, the situation was somewhat complicated by the arrival of birds belonging to the locally nesting group.

The total banded during the period April 5–30, was 130. Only five repeated, the last repeat record being on April 18. It is believed that a general exodus occurred on April 18, only three being banded from that date to the end of the month. A sex ratio of 63:58 was obtained; nine birds were not definitely sexed.

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*A contribution from the Wharton Bird Banding Station.

From this group of 130 birds, five recovery records (3.85 %)have been made up to the spring of 1942. The records follow:

BANDED		RECOVERED	
38-360544 ♂	Apr. 18, 1939	St. John, N. B.	May 3, 1940
37-300244 ♀	Apr. 9, 1939	Bathurst, N. B.	May 28, 1940
38-360533 ♂	Apr. 16, 1939	Matapedia, P. Q.	June 15, 1941
37-300256 ♂	Apr. 11, 1939	Pantego, N. C.	Jan. 24, 1940
38-360541 ♂	Apr. 17, 1939	Southampton Co., Va.	Jan. 27, 1942

To assume that the recovery records made by members of this flock of grackles indicate both nesting and wintering grounds, implies the retention of flock unity from the time fall migration begins until arrival in the general nesting region the following spring. The joining together of local nesting colonies into flocks immediately following the nesting season occurs. Such a flock was observed in Groton, Massachusetts on July 28, 1932, flocking to roost in large hardwood trees killed by damming the Nashua River. The flock numbered "hundreds", and was believed to contain also some Red-winged Blackbirds (*Agelaius p. phoeniceus*) and possibly Starlings (*Sturnus v. vulgaris*). Forbush (1927) also refers to the fall flocking of these birds, saying it occurs before the end of August. Observations of the arrival in spring of this species seem to bear out the theory of flock unity, large flocks arriving, later to disintegrate into smaller nesting colonies.

Excepting the many return records made during the spring and summer at the banding station and within a twenty mile radius of it, which incidently prove the general tendency of the species to return to nest to the same region, only the following recovery records from the grackles banded at Groton during the spring and summer months have been recorded:

BANDED		RECOVERED	
A373752 Juvenile	July 11, 1932	Jamesville, N. C.	Dec. 23, 1935
34-364858 ♂	June 9, 1938	Plymouth, N. C.	Nov. 14, 1938
38-360562 ♀	May 3, 1939	Stony Point, N. Y.	Apr. 1, 1940

Since 1932, a total of 513 local nesting grackles and their progeny have been banded. Yet to date not one recovery has been recorded from a locality at any distance to the north of Groton.

It is believed that the three recovery records in Canada from the migrating flock of grackles banded at Groton in April, 1939, are indicative of the general nesting territory of that flock. It is also believed that the two recovery records made during subsequent Januaries indicate the general wintering grounds of that flock. It is further believed that these records of banded grackles, and the sex ratio obtained, indicate the homogeneity of regional grackle flocks, and tend to show that flock unity is retained during fall migration, on the wintering grounds and during spring migration. Behaviorism such as this would be a potent influence in molding geographical subspecific forms.

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BEHAVIOR OF YOUNG BANK SWALLOWS AFTER FIRST LEAVING THE NEST

By DAYTON STONER

IN former reports (*Auk*, 43: 198–213, 1926; *ibid.*, 45: 41–45, 1928) I indicated that in Iowa, young Bank Swallows following initial flight, frequently wandered some distance from the parental abode, and often temporarily inhabited any burrow that might be at hand. At this period of their lives, therefore, family ties were broken and the identity of a given brood vanished. Again, at Oneida Lake New York, corroborative evidence of this circumstance has been offered (Roosevelt Wild Life Annals, 4, No. 2 : 122–233, 1936) through records obtained from the repeat recoveries of banded nestlings.

In an attempt to ascertain whether this phenomenon was still more widespread, perhaps universal in its scope within the geographic range of the bird, repeat records of young Bank Swallows banded and recovered in the Albany, New York area have been examined. The results of this review are presented in the following paragraphs.

No. H-94108, immature; banded June 27, 1933, in a sand pit ten miles west of Albany; another immature banded as No. H-94109 was in the same burrow; both were able to fly well. No. H-94108 was recaptured June 28, 1933, in a burrow fifteen feet from the one from which it was banded; the burrow contained two other banded immature repeats reared therein along with an unbanded bird from another burrow. Therefore, representatives of three different families were present in the burrow from which the three repeats were taken.

No. H-94110, immature; banded June 27, 1933, in a sand pit ten miles west of Albany. Recaptured next day in the same burrow but with an unbanded immature individual. Evidently the latter had entered the burrow some time during the twenty-four hours intervening between our visits.

No. H-94140, immature; banded June 28, 1933, in a gravel pit six miles northwest of Albany. Another immature was banded at

the same time from this burrow. No. H-94140 was recaptured June 29, 1933, in a burrow eight inches south of the one from which it was banded and containing also five somewhat smaller birds reared therein.

Nos. H-94148 and H-94149, immatures; banded 10.20 A.M. June 29, 1933, from a burrow in a sand pit ten miles west of Albany

FIG. 1. A gauze net placed over the mouth of the Bank Swallow burrow will capture the occupant as it emerges. The circle around the burrow entrance to the right indicates that a return was taken from this burrow. June, 1940. Albany, New York.

They were the only ones in the burrow at the time. Recaptured in the same burrow at 9.50 P.M. the same day, together with another banded repeat individual of the same family banded on June 27; also two unbanded immatures from another family which were furnished with bands. So, in this case, the three individuals previously banded from this burrow had returned to it for the night along with two unbanded individuals from another burrow.

No. H-94156, fledgling; unable to fly; banded June 29, 1933, in a gravel pit six miles northwest of Albany. Recovered July 12, 1933, in the same gravel pit but in a burrow 300 feet northwest of the one

from which it was banded. In this burrow at the time of its recovery were six other immatures (Nos. H-94171 to H-94176) banded previously from two different but adjacent burrows in this pit. Thus, after flight had been attained, representatives of three different families of young had come to rest in a burrow some distance removed from their respective parental burrows but in the same

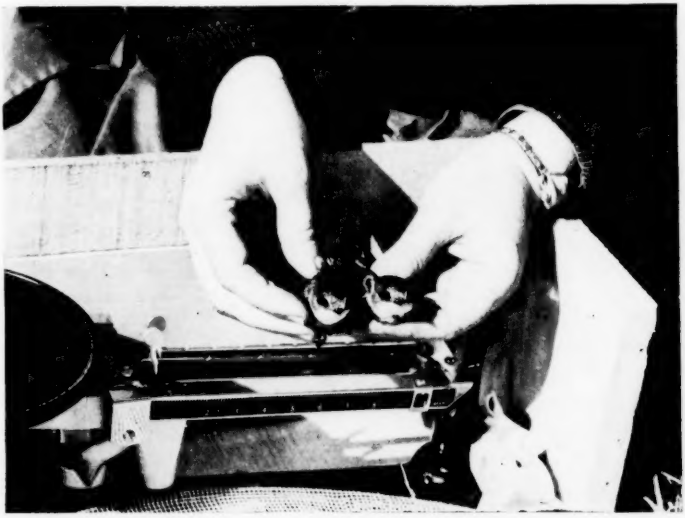

FIG. 2. Weights are taken of all return Bank Swallows. May, 1933. Oneida Lake, New York.

gravel pit as they were reared.

No. H-94181, immature; banded July 12, 1933, in a gravel pit six miles northwest of Albany. Another bird in the nest would not flush; a third was taken for a specimen. Two days later, No. H-94181 was recaptured from the original burrow; but with it were two unbanded young able to fly. One of these may have been the immature that would not flush on July 12 but the other probably was reared in another burrow.

No. L-7179, immature; banded June 18, 1934, in a sand pit ten miles west of Albany. Recovered in same burrow two days later. Since the bird was able to fly well at the time of banding and was released in the air after it was banded, we know that this individual

did return to the parental burrow after initial flight.

No. 38-78108, immature, one of a family of four; banded July 6, 1938. Recovered in the same burrow and the only occupant thereof July 8, 1938. This individual also returned to the natal burrow to rest after flight ability was attained. However, circumstantial evidence suggests that not all the other members of this family group shared this behavior.

Data from twenty-three banded immature repeat Bank Swallows and eleven other unbanded immature individuals are here recorded for the Albany, New York region. From these records which supplement and confirm the information on the same subject obtained in the Oneida Lake, New York and the Lake Okoboji, Iowa areas, it appears evident that young Bank Swallows following initial flight, may or may not return to the natal burrow to rest. The incidence of such return is perhaps 15 to 20 per cent. Co-existent with this is the fact that family ties are likely to be broken after first flight and a given brood loses its identity therewith. Young birds with flight ability frequently adopt transitory abodes and associate temporarily with others of their kind in any burrow that may be within the limited range of their first aerial sorties. As the season advances this range is gradually extended contemporaneously with the abandonment of the habit of assembling in the burrows.

New York State Museum, Albany, New York.

RETURNS FROM BANDED BIRDS
SOME LONGEVITY RECORDS OF WILD BIRDS

By MAY THACHER COOKE

(*Continued from page 74*)

HORNED LARK. *Otocoris alpestris*

F132697, banded at Jamestown, N. Dak., on December 27, 1933, by C. E. Boardman, was found dead at Raymore, Sask., in the spring of 1938.

TREE SWALLOW. *Iridoprocne bicolor*

*C6633, banded at Brewer, Maine, on June 29, 1929, by H. J. Robinson, was found dead at Hampden, Maine, May 26, 1936.

C160211, banded at Pomfret, Conn., on June 11, 1933, by Mrs. K. B. Wetherbee, was retrapped at same place June 12, 1938.

*F76398, banded at Princeton, Mass., on June 22, 1932, by L. B. Chapman, was retaken at the nest box at the same place, June 24, 1939.

*H12109, banded at North Eastham, Mass., on June 19, 1932, by O. L. Austin, was retrapped June 9, 1939.

H12167, banded at North Eastham, Mass., on June 22, 1932, by O. L. Austin, was retrapped at same place June 2, 1938.

*34-18072, banded at North Eastham, Mass., on June 5, 1934, by O. L. Austin, was retrapped at same place, June 9, 1939.

BARN SWALLOW. *Hirundo erythrogaster*

H20505, banded at Shirley, Mass., on July 9, 1932, by E. M. Davis, was retrapped at same place May 9, 1937. (Fifth return.)

*L21982, banded 12 miles south of Canton, Ohio, on June 19, 1933, by Howard Braun, was caught at night with net at same place, June 25, 1938.

PURPLE MARTIN. *Progne subis*

A227250, banded at Winnipeg, Man., on July 18, 1930, by A. M. Davidson, was found dead at same place June 6, 1935.

*A286846, banded at Columbus, Mo., on June 18, 1932, by C. E. Northcutt, was found dead at Hill View, Ill., May 13, 1938.

CANADA JAY. *Perisoreus canadensis*

643942, banded at Barkerville, B. C., on March 25, 1929, by Mrs. T. T. McCabe, was retrapped and released at same place August 9, 1935.

BLUE JAY. *Cyanocitta cristata*

414306, banded at Lakewood, Ohio, on November 15, 1927, by E. C. Hoffman, was retrapped at same place November 29, 1927, May 27, 1928, June 3, 1928, December 15, 1929, January 19, 1930, May 25, 1930, and August 24, 1930, and May 23, 1937.

*546574, banded at Muncie, Ind., on June 30, 1928, by O. B. Christy, was found dead at same place about August 31, 1936.

*A253386, banded at Madison, Wis., on July 22, 1931, by H. Bunting, was retrapped near banding place November 17, 1932, May 15, 1934, May 2, 1937, and October 14, 1937.

A287321, banded at Huntington, L. I., N. Y., on August 22, 1932, by Geoffrey Gill, was retrapped at same place November 1, 1933, January 19, 1935, May 25, 1937, and October 10, 1938.

A292688, banded at Plainfield, N. J., on November 11, 1931, by F. C. Scott, was found dead at same place September 1, 1938.

A318412, banded at Amherst, Mass., on January 26, 1930, by Mrs. H. C. Thorp, was found wounded at the same place, November 20, 1940.

A368347, banded at Wilmette, Ill., on October 10, 1931, by Mrs. Mary Hall Schaub, was retrapped at same place June 6, 1938.

A375773, banded at Notre Dame, Ind., on July 26, 1930, by D. K. Stephenson, was retrapped at same place July 27, 1936.

A387307, banded at Hubbard Woods, Ill., on June 28, 1932, by Harold H. Hayes, was retrapped at same place May 29, 1938.

A391665, banded at Oak Bluffs, Mass., on August 16, 1931, by J. A. Gillespie, was retrapped at same place August 18, 1937.

A392716, banded at Cincinnati, Ohio, on April 24, 1932, by C. J. Goetz, was retrapped at same place May 24, 1938.

A396519, banded at Fort Smith, Ark., on July 29, 1931, by S. H. Weakley, was killed at same place July 5, 1938.

A404451, banded at Notre Dame, Ind., on June 29, 1929, by D. K. Stephenson, was trapped and released at same place July 17, 1936 and May 14, 1937.

B324607, banded at Sioux Falls, S. Dak., on August 18, 1931, by Mrs. Blanche M. Getty, was found injured at same place July 24, 1938.

B331864, banded at Russiaville, Ind., on July 5, 1932, by L. E. Carter, was retrapped at same place December 19, 1938.

*B361977, banded at Allegan, Mich., on August 12, 1932, by D. S. O'Meara, was found dead at same place August 4, 1937.

*B361312, banded at Kansas City, Mo., on June 14, 1932, by Harold Hedges, was caught in a rat trap at same place July 1, 1939.

B382220, banded at Detroit, Mich., on March 28, 1933, by R. D. Dieterle, was found at same place February 9, 1939.
B393424, banded at St. Petersburg, Fla., on May 13, 1933, by G. D. Robinson, was killed by trolley wire at same place April 27, 1938.
34-319257, banded at Russiaville, Ind., on June 16, 1932, by L. E. Carter, was retrapped at same place December 29, 1938.

STELLER'S JAY. *Cyanocitta stelleri*

B324251, banded at Big Basin, Calif., on August 23, 1933, by E. H. Price, was shot at San Francisco, Calif., July 5, 1939.

WHITE-NECKED RAVEN. *Corvus cryptoleucus*

*B647180, banded near Talpa, Tex., on June 7, 1932, by S. E. Aldous, was killed in Runnels County, Tex., November 13, 1937.
*B647232, banded near Albany, Tex., on June 12, 1932, by S. E. Aldous, was found at Weinert, Tex., about March 5, 1938.
B647373, banded at Ft. Stockton, Tex., on October 18, 1932, by S. E. Aldous was shot at Crane, Tex., June 24, 1937.
B647394, banded at Ft. Stockton, Tex., October 19, 1932, by S. E. Aldous, was killed at Lamesa, Tex., about April 22, 1937.
B647402, banded at Ft. Stockton, Tex., on October 21, 1932, by S. E. Aldous, was shot 35 miles southeast of Pecos, Tex., April 17, 1938.

CROW. *Corvus brachyrhynchos*

21112—, banded at Otto, Man., in April, 1924, by A. L. Holm, was killed at Sherman, S. Dak., January 13, 1938.
A549872, banded at Cupar, Sask., on June 30, 1933, by W. F. Hammond, was shot at Markinch, Sask., June 4, 1938.

BLACK-CAPPED CHICKADEE. *Penthestes atricapillus*

B79283, banded at Bar Harbor, Maine, on October 30, 1931, by Mrs. Effie A. Anthony, was retrapped at same place May 4, 1939, found dead the following day.
A88689, banded at Milton, Mass., on October 12, 1929, by W. R. Peabody, was retrapped at same place October 28, 1931, November 18, 1933, January 5, 1935, September 11, 1935, and October 1, 1936.
C21641, banded at Bar Harbor, Maine, on October 16, 1929, by Mrs. Effie A. Anthony, was retrapped at same place November 27, 1936 and November 12, 1937. (See vol. 8, 1937 p. 59, for other returns.)
F88017, banded at Blaney Park, Mich., on April 6, 1932, by K. Christofferson, was retrapped at same place January 28, 1933, October 11, 1933, October 20, 1935, March 12, 1936, February 21, 1938, and December 11, 1938.
H81464, banded at Bar Harbor, Maine, on November 19, 1933, by Mrs. Effie A. Anthony, was retrapped at same place March 11, 1939.
L60454, banded at Milton, Mass., on February 10, 1934, by E. P. Hamilton, was retrapped at same place January 14, 1939.

MOUNTAIN CHICKADEE. *Penthestes gambeli*

C97908, banded at Summerland, B. C., on December 28, 1930, by S. A. Liddell, was retrapped at same place March 3, 1938.

TUFTED TITMOUSE. *Baeolophus bicolor*

C152268, banded at Foster, Ohio, on December 17, 1932, by B. C. Saur, was retrapped at same place November 6, 1938.

WHITE-BREASTED NUTHATCH. *Sitta carolinensis*

H72700, banded at Grand Canyon, Ariz., on December 3, 1932, by E. D. McKee, was retrapped at same place June 19, 1936 and February 2, 1937.

C171897, banded at Grand Canyon, Ariz., on September 16, 1933, by E. D. McKee, was retrapped at same place December 9, 1938.

RED-BREASTED NUTHATCH. *Sitta canadensis*

L60526, banded at Bar Harbor, Maine, on April 5, 1934, by Mrs. Effie A. Anthony, was retrapped at same place September 24, 1936, April 12, 1937 and December 31, 1937.

PYGMY NUTHATCH. *Sitta pygmaea*

H1522, banded at Grand Canyon, Ariz., on October 23, 1932, by E. D. McKee, was retrapped at same place September 24, 1938.

H1523, banded at Grand Canyon, Ariz., on October 23, 1932, by E. D. McKee, was retrapped at same place October 8, 1938.

HOUSE WREN. *Troglodytes aedon*

F95810, banded at Pomfret, Conn., on June 11, 1933, by Mrs. K. B. Wetherbee, was retrapped at same place June 20, 1938.

H18052, banded at Gates Mills, Ohio, on July 28, 1932, by S. P. Baldwin, was retrapped at same place June 15, 1933, June 19, 1934, June 15, 1935, and July 27, 1937.

H77253, banded at Norristown, Pa., on May 10, 1933, by R. J. Middleton, was retrapped for the fourth year at same place April 30, 1938.

MOCKINGBIRD. *Mimus polyglottos*

B201482, banded at Ft. Smith, Ark., on February 1, 1933, by S. H. Weakley, was retrapped at same place March 12, 1937.

B25787—, banded at St. Petersburg, Fla., about July 1, 1933, by G. D. Robinson, was captured and released at same place January 14, 1939.

B270752, banded at Nashville, Tenn., on September 15, 1933, by Mrs. F. C. Laskey, was retrapped near place of banding May 27, 1938. This was the first return.

CATBIRD. *Dumetella carolinensis*

355394, banded at Ithaca, N. Y., on August 9, 1934, by A. C. Fraser, was retrapped at same place May 13, 1936, May 23, 1938, and May 17, 1939.

*633622, banded at Waynesville, N. C., on August 19, 1929, by Miss M. A. Boggs, was retrapped at same place May 29, 1937.

A253044, banded at Madison, Wis., on May 12, 1933, by George Wagner, was retrapped May 11, 1936 and May 16, 1939, at same place.

*A276540, banded at Notre Dame, Ind., on June 27, 1931, by D. K. Stephenson, was retrapped at same place May 28, 1937.

B263326, banded at Blue Island, Ill., on August 20, 1933, by K. E. Bartel, was retrapped at same place May 23, 1937 and May 12, 1938.

C143341, banded at Demarest, N. J., on July 8, 1933, by B. S. Bowdish, was retrapped at same place June 6, 1938.

BROWN THRASHER. *Toxostoma rufum*

461076, banded at Waynesville, N. C., on August 19, 1926, by Miss M. A. Boggs, was retrapped at same place June 4, 1937 and April 24, 1938. (See vol. 10, p. 43, where this is listed as the eleventh return.)

475402, banded at Waseca, Minn., on July 11, 1931, by Miss Constance Everett, was retrapped and released at same place June 13, 1938.

A273715, banded at Huntington, L. I., N. Y., on May 4, 1932, by Geoffrey Gill, was retrapped at same place May 10, 1933, May 18, 1934, May 14, 1935, May 13, 1936, and May 20, 1937.

*A298946, banded at Amherst, Mass., on August 19, 1932, by Mrs. F. M. Cutler, was retrapped at same place May 15, 1934, May 17, 1935, May 16, 1936, May 20, 1937, May 26, 1938, and June 8, 1939.

A309551, banded at Demarest, N. J., on May 20, 1929, by B. S. Bowdish, was rebanded with C331693, July 14, 1934 and again retrapped at same place June 18, 1936.

A368657, banded at Lisle, Ill., on May 31, 1931, by Dr. E. Jurica and V. Lakatek, was retrapped a third time at same place June 28, 1937.

B331501, banded at Madison, Wis., on May 26, 1933, by George Wagner, was retrapped April 29, 1935, May 6, 1936, and May 4, 1939.

CALIFORNIA THRASHER. *Toxostoma redivivum*

592720, banded in Santa Cruz Mountains, Santa Clara County, Calif., on February 3, 1933, by E. L. Sumner, Jr., was retrapped 1 mile from banding place January 21, 1938.

ROBIN. *Turdus migratorius*

A234137, banded at Zion, Ill., on September 12, 1930, by Louise J. Miller, was retrapped at same place August 18, 1938.

A251834, banded at Cincinnati, Ohio, on May 30, 1930, by C. J. Goetz, was retrapped and rebanded with 36-210582 at same place July 19, 1936.

A259369, banded at Worcester, Mass., on April 29, 1931, by Mrs. K. B. Wetherbee, was observed at same place May 5, 1936, identified by colored band.

A264134, banded at Northville S. Dak., on April 13, 1932, by J. F. Brenckle, was retrapped April 9, 1934, and July 4, 1937.

*A271659, banded in Hamilton County, Ohio, on April 29, 1932, by C. J. Goetz, was found crippled at Greenville, Ala., February 15, 1939.

*B209215 banded at Wilton, N. Dak., on July 25, 1932, by Mrs. Hannah R. Gray, was retrapped at same place on April 18, 1937.

B230628, banded at Northville, S. Dak., on September 12, 1932, by J. F. Brenckle, was killed at Stillwell, Okla., September 1937.

B335488, banded at Fargo, N. Dak., on October 4, 1932, by T. W. Johnson, was retrapped at same place September 22, 1938.

B338825, banded at Ottawa, Ont., on August 23, 1933, by R. E. DeLury, was found dead near banding place June 26, 1938.

B340221, banded at Philadelphia, Pa., on July 20, 1932, by Dr. Wm. Pepper, was retrapped at same place March 13, 1936, and April 7, 1938, when band was changed to 37-242878.

B370198, banded at East Durham, N. Y., on June 3, 1934, by Vernon Haskins, was captured and released near Statesville, N. C., March 8, 1939.

HERMIT THRUSH. *Hylocichla guttata*

F125555, banded at Altadena, Calif., on October 25, 1933, by W. I. Allen, was retrapped at same place November 20, 1938.

F125564, banded at Altadena, Calif., on November 12, 1933, by W. I. Allen, was retrapped at same place March 8, 1939.

CEDAR WAXWING. *Bombycilla cedrorum*

35-115973, banded at Modesto, Calif., on March 24, 1936, by Irl Rogers, was found dead at Garden Grove, Calif., April 26, 1940.

*C-140722, banded at Winnipeg, Man., on August 12, 1932, by V. W. Jackson, was probably found dead at Lawson, Ky., February 9, 1937.

SHRIKE. *Lanius ludovicianus*

A279800, banded at Los Angeles, Calif., on August 23, 1931, by J. L. Partin, was shot while destroying nest of young Mockingbirds at Los Angeles, Calif., July 1936.

STARLING. *Sturnus vulgaris*

A213620, banded at Columbus, Ohio, on February 16, 1929, by L. E. Hicks, was retrapped at same place March 23, 1939.

A244039, banded at Wayne, Pa., on April 1, 1933, by C. Brooke Worth, was shot at same place March 12, 1938.

A294909, banded at Overbrook, Pa., on November 24, 1931, by H. P. Bailey was found at Narberth, Pa., March 4, 1939.

B228042, banded at Columbus, Ohio, on December 12, 1932, by L. E. Hicks, was retrapped at same place March 23, 1937.

B235324, banded at Columbus, Ohio, on February 13, 1932, by L. E. Hicks, was found, probably dead, at Briggsdale, Ohio, May 17, 1937.

34-206534, banded at Chicago, Ill., on December 27, 1933, by C. B. Coursen, was found, probably dead, in Chicago, Ill., February 21, 1939.

RED-EYED VIREO. *Vireo olivaceus*

H21734, banded at Norristown, Pa., on August 26, 1932, by R. J. Middleton, was found dead 1½ miles from place of banding June 7, 1938.

MYRTLE WARBLER. *Dendroica coronata*

H34352, banded at Huntington, L. I., N. Y., on October 23, 1933, by Geoffrey Gill, was killed at Dunbar, S. C., February 1, 1940.

AUDUBON'S WARBLER. *Dendroica auduboni*

34-97298, banded at Altadena, Calif., on December 1, 1935, by Walter I. Allen, was retrapped at same place February 13, 1940.

PINE WARBLER. *Dendroica pinus*

L39797, banded at North Eastham, Cape Cod, Mass., on September 1, 1934, by O. L. Austin, was retrapped at same place May 27, 1939.

L39839, banded at North Eastham, Mass., on September 7, 1934, by O. L. Austin, was killed by auto at same place June 20, 1939.

OVENBIRD. *Seiurus aurocapillus*

L13327, banded 5 miles southwest of Ann Arbor, Mich., on July 3, 1935, by Harry W. Hann, was observed at the same place, identified by colored band, May 7, 1940.

MARYLAND YELLOW-THROAT. *Geothlypis trichas*

H17826, banded at Nashville, Tenn., on August 31, 1932, by Mrs. F. C. Laskey, was retrapped at same place June 23, 1937.

H93669, banded at Northville, S. Dak., on May 27, 1933, by J. F. Brenckle, was retrapped at same place June 10, 1934 and June 6, 1937, and the band changed to 37-93107.

YELLOW-HEADED BLACKBIRD. *Xanthocephalus xanthocephalus*

*B216433, banded near Great Falls, Mont., on June 13, 1932, by V. L. Marsh, was found dead at Farmington, Mont., about June 10, 1937.

RED-WINGED BLACKBIRD. *Agelaius phoeniceus*

A163007, banded at Gulfport, Fla., on April 19, 1932, by Mrs. Daisie M. Morrison, was retrapped at same place April 20, 1937.

A264384, banded at Branchport, N. Y., on August 30, 1931, by Verdi Burtch, was retrapped at same place August 18, 1936.

A267467, banded at North Eastham, Mass., on April 18, 1932, by O. L. Austin, was found dead at South Westport, Mass., May 30, 1938.

A277036, banded at North Eastham, Mass., on May 2, 1931, by O. L. Austin, was retrapped at same place May 20, 1937.

A337575, banded at Avery Island, La., on February 16, 1933, by E. A McIlhenny, was retrapped at the same place September 24, 1938.

A337583, banded at Avery Island, La., on February 16, 1933, by E. A. McIlhenny, was retrapped at the same place October 8, 1938.
*B209245, banded at Wilton, N. Dak., on August 14, 1932, by Mrs. Hannah R. Gray, was shot at Arden, Ark., February 4, 1939.
B231582, banded at Branchport, N. Y., on September 7, 1933, by Verdi Burtch, was found dead near Hammondsport, N. Y., April 18, 1938.
A277162, banded at North Eastham, Mass., on May 28, 1931, by O. L. Austin, was retrapped at the same place July 16, 1937.

TRI-COLORED REDWING. *Agelaius tricolor*

*A236238, banded near Glenn, Calif., on May 31, 1931, by T. T. McCabe, was shot at Maxwell, Calif., March 31, 1937.
*A275036, banded at Princeton, Calif., on May 30, 1931, by T. T. McCabe, was probably found dead at Colusa, Calif., about February 5, 1938.
*A275400, banded near Glenn, Calif., on May 31, 1931, by T. T. McCabe, was shot at Richvale, Calif., October 5, 1936.

BALTIMORE ORIOLE. *Icterus galbula*

*691257, banded at Winnipeg, Man., on August 10, 1930, by Paul Kuntz, was caught by a cat in Winnipeg, Man., May 26, 1937.
C159049, banded at Zion, Ill., on May 15, 1933, by C. E. Holcombe, was found dead at the same place June 2, 1938.

RUSTY BLACKBIRD. *Euphagus carolinus*

A391050, banded at Fort Smith, Ark., on April 6, 1931, by S. H. Weakley, was shot near Shelby, Miss., January 30, 1939.
B201584, banded at Fort Smith, Ark., on March 5, 1933, by S. H. Weakley, was killed at Boynton, Ark., February 25, 1937.
B20354—, banded at Fort Smith, Ark., on March 10, 1933, by S. H. Weakley, was found dead at Sac City, Iowa, July 9, 1940.

BREWER'S BLACKBIRD. *Euphagus cyanocephalus*

A283526, banded at Los Angeles, Calif., on July 15, 1932, by Mrs. F. T. Bicknell, was found dead at same place December 28, 1937.
*C103394, banded at Pasadena, Calif., on June 26, 1933, by H. Michener, was found dead at Altadena, Calif., April 8, 1938.

GRACKLE. *Quiscalus quiscula*

316390, banded at Paoli, Pa., on July 28, 1924, by H. D. McCann, was found dead at Upper Darby, Pa., October 13, 1938. This is apparently the oldest record to date for a passerine species.
468069, banded at Waseca, Minn., on August 14, 1931, by Miss Constance A. Everett, was found dead at Waseca, Minn., June 9, 1936.
712534, banded at Auburndale, Mass., on April 22, 1929, by C. B. Floyd, was shot at same place June 18, 1937.
A311691, banded at Crystal Bay, Minn., on April 25, 1929, by Frank W. Commons, was drowned in minnow box at Orono, Lake Minnetonka, Minn., June 22, 1938.
A408856, banded at Oak Bluffs, Mass., on July 23, 1930, by J. A. Gillespie, was trapped at the same place July 23, 1936, and rebanded with A462454.
*A412618, banded at Keokuk, Iowa, on September 13, 1929, by M. Meigs, was captured at Lake Village, Ark., February 6, 1939.
A412940, banded at Hillsdale, Mich., on July 2, 1930, by F. Smith, was found dead at Plainville, Mich., May 20, 1937.
A421178, banded at Waukegan, Ill., on February 3, 1932, by W. I. Lyon, was found at Clinton, Ky., March 8, 1938.

A422948, banded at Glenolden, Pa., on June 2, 1932, by J. A. Gillespie, was retrapped at same place May 30, 1938 and rebanded with 38-300453.
A446165, banded at Kansas City, Mo., on June 6, 1932, by H. C. Hedges, was found injured at Houston, Texas, February 1, 1937. It was cared for and released February 23, 1937, and was recaptured at place of banding May 19, 1937.
B201224, banded at Copemish, Mich., on April 29, 1932, by F. W. Hatch, was killed in rat trap at Copemish, Mich., April 19, 1937.
B347628, banded at Northville, S. Dak., on September 6, 1932, by J. F. Brenckle, was found dead at Hardin, Texas, February 25, 1937.
B361501, banded at Indianapolis, Ind., on June 20, 1932, by A. D. Heath, was found dead near Kennett, Mo., March 2, 1937.
B378410, banded at Fargo, N. Dak., on September 3, 1932, by H. G. Heggeness, was caught at Kilgore, Texas, March 4, 1937.

COWBIRD. *Molothrus ater*

B204603, banded at Ottawa, Ont., on April 17, 1932, by R. E. DeLury, was killed at Trenton, Tenn., January 11, 1937.
B204619, banded at Ottawa, Ont., on April 28, 1932, by R. E. DeLury, was killed in Colleton County, S. C., November 21, 1936.

CARDINAL. *Richmondena cardinalis*

477220, banded at Merion, Pa., on March 24, 1930, by Geo. H. Beatty, Jr., was found dead about a mile from the banding station, July 4, 1938.
A191995, banded at Platteville, Wis., on December 6, 1931, by Leo Speth, was found, probably dead, at same place, September 10, 1938.
A223258, banded at Goshen, Ind., on January 31, 1931, by S. W. Witmer, was retrapped at same place May 16, 1937, and rebanded with 36-206902.
A271754, banded at Cincinnati, Ohio, on July 10, 1932, by C. J. Goetz, was retrapped at same place August 31, 1937, and rebanded with 37-222448.
A281658, banded at Water Valley, Miss., on March 31, 1933, by E. Earl Bell, was retrapped at same place March 17, 1937.
A337672, banded at Avery Island, La., on February 22, 1933, by E. A. McIlhenny, was retrapped at same place October 1, 1938.

ROSE-BREASTED GROSBEAK. *Hedymeles ludovicianus*

B169381, banded at Milford, N. H., on June 24, 1932, by J. P. Melzer, was retrapped at same place July 3, 1938 and May 14, 1939.
34-235618, banded at Lexington, Mass., on June 11, 1934, by Mrs. Ada C. Govan, was retrapped at same place May 18, 1939. (Fifth return.)
34-235623, banded at Lexington, Mass., on July 7, 1934, by Mrs. Ada C. Govan, was retrapped at same place May 23, 1939. (Fifth return.)

BLACK-HEADED GROSBEAK. *Hedymeles melanocephalus*

A284151, banded at Yosemite National Park, Calif., on May 5, 1933, by A. E. Borell, was retrapped at same place June 28, 1938.
A284401, banded at Flagstaff, Ariz., on May 28, 1933, by L. L. Hargrave, was retrapped at same place May 16, 1938.
A284406, banded at Flagstaff, Ariz., on June 4, 1933, by L. L. Hargrave, was retrapped at same place May 26, 1938.
A284473, banded at Yosemite National Park, Calif., on July 11, 1933, by M. E. Beatty, was retrapped at same place May 5, 1938.
C175524, banded at Yosemite National Park, Calif., on July 14, 1933, by M. E. Beatty, was retrapped at same place May 6, 1937.

INDIGO BUNTING. *Passerina cyanea*

F19694, banded at Oliverea, N. Y., on June 16, 1932, by Mrs. Florence K. Daley, was retrapped at same place June 5, 1937.

*H73036, banded at Nashville, Tenn., on August 30, 1933, by Mrs. F. C. Laskey, was retrapped at same place May 19, 1938. Head pecked by unknown bird causing death. (Fourth return.)

*34-87190, banded at Nashville, Tenn., on May 17, 1935, by Mrs. F. C. Laskey, was retrapped at same place May 10, 1939, and May 8, 1940. (Fifth return.)

EVENING GROSBEAK. *Hesperiphona vespertina*

A210132, banded at Sault Ste. Marie, Mich., on February 6, 1929, by M. J. Magee, was retrapped at same place January 23, 1937.

A210144, banded at Sault Ste. Marie, Mich., on February 8, 1929, by M. J. Magee, was retrapped same place January 27, 1937.

A272594, banded at Winnipeg, Man., on March 7, 1933, by P. Kuntz, was killed by auto at Elk Rapids, Mich., March 24, 1937.

A275907, banded at Blaney Park, Mich., on May 19, 1934, by K. Christofferson, was retrapped at Sault Ste. Marie, Mich., May 13, 1939.

A280075, banded at Sault Ste. Marie, Mich., on January 10, 1932, by M. J. Magee, was probably found dead about February 27, 1939, at Ottawa, Ont.

PURPLE FINCH. *Carpodacus purpureus*

B69074, banded at Peterboro, N. H., on July 16, 1930, by C. L. Whittle, was retrapped at same place Mary 6, 1936.

B69259, banded at Peterboro, N. H., on April 21, 1931, by C. L. Whittle, was retrapped at same place July 20, 1938.

B91669, banded at Blaney Park, Mich., on May 1, 1933, by K. Christofferson, was retrapped at same place May 11, 1934, July 18, 1935, April 30, 1936, April 23, 1937, and May 4, 1938.

B107252, banded at Bar Harbor, Maine, on May 13, 1930, by Mrs. Effie A. Anthony, was retrapped at same place May 14, 1937 and July 26, 1938.

B114019, banded at Northeast Harbor, Maine, on August 1, 1930, by H. P. Baily, was retrapped at same place August 13, 1937.

B132232, banded at Milford, N. H., on April 16, 1931, by J. P. Melzer, was retrapped at same place April 24, 1937.

B152932, banded at Bar Harbor, Maine, on June 28, 1931, by Mrs. Effie A. Anthony, was retrapped at same place April 29, 1938.

B158483, banded at Athol, Mass., on September 29, 1931, by Robert Allison, was retrapped at same place April 4, 1938.

B160044, banded at Bar Harbor, Maine, on July 22, 1931, by Mrs. Effie A. Anthony, was retrapped at same place June 30, 1937 and May 5, 1938.

B203109, banded at Pomfret, Conn., on August 4, 1932, by Mrs. K. B. Wetherbee, was retrapped at same place May 10, 1936.

C121565, banded at Sault Ste. Marie, Mich., on May 13, 1932, by M. J. Magee, was retrapped at same place April 20, 1938.

*F38113, banded at Groton, Mass., on July 22, 1931, by W. P. Wharton, was retrapped at same place July 20, 1936 and May 22, 1937.

C121824, banded at Sault Ste. Marie, Mich., on July 16, 1932, by M. J. Magee, was retrapped at same place May 23, 1939.

C199873, banded at Milford, N. H., on May 7, 1933, by J. P. Melzer, was shot at Greenville, N. C., on January 29, 1939.

F47227, banded at Sault Ste. Marie, Mich., on July 8, 1931, by M. J. Magee, was retrapped at same place May 1, 1937.

F61943, banded at Sault Ste. Marie, Mich., on October 1, 1931, by M. J. Magee, was retrapped at same place October 6, 1937 and October 15, 1938.

F91085, banded at Milton, Mass., May 4, 1932, by W. R. Peabody, was retrapped at same place April 21, 1935, April 28, 1936, and June 29, 1937.

H58428, banded at Worcester, Mass., on January 6, 1933, by Mrs. K. B. Wetherbee, was retrapped at same place March 12, 1939.

H89206, banded at Sault Ste. Marie, Mich., on May 4, 1933, by M. J. Magee, was retrapped at same place May 6, 1934, May 5, 1935, May 1, 1938, May 14, 1940, and May 11, 1941.

HOUSE FINCH. *Carpodacus mexicanus*

C41213, banded at Los Angeles, Calif., on April 17, 1931, by Miss Blanche Vignos, was retrapped at same place March 6, 1936.

F32934, banded at Los Angeles, Calif., on June 20, 1931, by J. L. Partin, was found dead at same place about September 24, 1936.

*F37062, banded at Los Angeles, Calif., on July 27, 1931, by Miss Blanche Vignos, was retrapped at same place May 27, 1936.

F89929, banded at Pasadena, Calif., on June 29, 1932, by Mrs. Harold Michener, was retrapped at same place December 9, 1935 and March 13, 1937.

GOLDFINCH. *Spinus tristis*

C117245, banded at Fort Smith, Ark., on January 5, 1933, by S. H. Weakley, was retrapped at same place March 1, 1936 and January 21, 1939.

F29861, banded at Milton, Mass., on March 25, 1931, by W. R. Peabody, was retrapped at same place March 24, 1937.

H81110, banded at Fort Smith, Ark., on March 3, 1933, by S. H. Weakley, was retrapped at same place January 26, 1936, February 5, 1938, and December 18, 1938.

(to be concluded)

GENERAL NOTES

Killdeer Nesting near Heavy Artillery.—When one considers the terrific muzzle-blast of large caliber guns, the following incident reported to me by Lieutenant-Commander F. L. Busey, of the U. S. Naval Proving Ground, at Dahlgren, Va., is truly remarkable.

Commander Busey writes that Killdeers (*Oxyechus vociferus*) "nested and hatched young about 100 feet in front of the muzzles of the 16-inch guns. These guns were fired three or four times per week and the nests were located almost in the position of the greatest gunblast effect. When the guns were fired the birds were seen to fly away but returned shortly. Battery attendants examined the nests and noticed that the eggs did not break or roll out of the nests as a result of the firing. After the young were hatched they were seen walking on the ground in the vicinity of the nest, but they disappeared from the vicinity shortly after."

The Commander adds that Quail (Bob-white) are noticed continuously on the ground within 400 feet of the muzzles of the big guns but, while no particular search has been made, no one has discovered any nests of these birds. In this connection it may be pointed out that the reservation of the Proving Ground is a game sanctuary and battery attendants and workmen are in the habit of putting out food for birds. As a result the birds are very tame and coveys of Bob-white are frequently seen in the vicinity of the firing and bombing areas. Commander Busey states that from his own experience it is very difficult to frighten the coveys and that they rarely flush except when in danger of automobiles on the roads.—Frederick C. Lincoln, Fish and Wildlife Service, Washington, D. C.

Two Notes on Kingbird Behavior.—While stopping for gasoline at Livingston Manor, New York, on June 20, 1941, my attention was attracted by the characteristic, monotonous food call of nestling Baltimore Orioles (*Icterus galbula*) coming from an apple tree across the highway. The nest was easily located and, wishing to examine the young, I climbed the tree. This alarmed the parents and a pair of Kingbirds (*Tyrannus tyrannus*) as well. The cause for the kingbirds' concern was revealed when I discovered that they were nesting in the same tree as the orioles, and not far from them. The latter's nest was about twenty feet above the ground and attached to a nearly upright branch in the top of the tree,

which itself was not more than 22 feet high. The nest of the kingbirds was approximately thirteen feet from the ground and on a horizontal limb. The two nests were not more than fifteen feet apart, the orioles' being west of the kingbirds' and on an angle of about 40 degrees.

The kingbird was clearly the second of the two species to select the tree as a nest site, for its eggs had just hatched whereas the orioles were almost ready to leave their nest. In this case then, the oriole, which has been known to "do battle" with the kingbird, permitted the latter's presence in that small tree. Considering the kingbird to be a jealous guardian of its nest tree, it would be interesting to know whether it would tolerate a pair of orioles as the orioles had tolerated it.

The second of these short notes concerns a pair of kingbirds nesting at Beaver Kill, New York, five miles from Livingston Manor. Their nest was discovered on June 19, 1941, when it contained three eggs. On July 6 these eggs were still unhatched; four days later the nest was empty. At this later date (July 10) the birds were still present, and one was seen perched about three feet from the nest and on the same branch. They scolded when I climbed the tree, but did not display conspicuously. Although there were two eggs in this nest on July 21, only one cracked egg lay in it on July 29. Since the kingbird is said usually to rebuild nearby if its first nest is molested or destroyed, this occurrence is unusual in that the same nest was unsuccessfully used for two sets of eggs.

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RICHARD B. FISCHER, 140-19 Beech Avenue, Flushing, New York.

A Simple Method for the Capture of Bank Swallows.—While earth was being moved in the construction of an athletic field on the campus of Kent State University, some fresh gravel banks were left exposed during the spring of 1939. Many Bank Swallows (*Riparia riparia riparia* (Linn), and a number of Rough-winged Swallows (*Stelgidopteryx ruficollis serripennis* (Audubon)) tunnelled into these banks for a nesting site. Several students (Carl Rosenberger, Kenneth Chiavetta, and Leslie Sheary), assisting the writer with bird-banding studies, developed a simple technique for capturing these swallows for banding. One person would stamp about over the top of the bank while one or more would stand close by the tunnels. As the birds emerged as a result of the disturbance, they were captured by the sweep of an insect net. Twenty-four Bank Swallows, half of which were young birds, were captured in this manner. Two individuals were recaptured. One Rough-winged Swallow was banded and recaptured twice. R. B. Fischer described (*Bird-Banding* 13 (1) : 31-33. 1942) a similar method for capturing Barn Swallows.—RALPH W. DEXTER, Kent State University, Kent, Ohio.

Returns from a Nest of Banded Crows.—On May 18, 1941, we banded a group of five crow nestlings (*Corvus brachyrhynchos brachyrhynchos* Brehm) in a single nest in a tree at Bedford, Ohio. Twenty days later, on June 7th, one of these birds (Biol. Surv. 39-520912) was shot in Cleveland. On September 24th, eighteen weeks from the time of banding, two others (Biol. Surv. 39-520914 and 39-420916) was shot at Oxford, Ohio, some 225 miles southwest of Bedford. It is interesting that the Oxford returns were made by a person from Bedford.—RALPH W. DEXTER, Kent State University, Kent, Ohio.

Unusual Chickadee Returns.—On November 10, 1936 I banded two Black-capped Chickadees (Nos. 35-5166 and 35-5168), the first at 3:15 and the second at 3:30 P.M. Both these birds were retaken together at 8:15 A.M. on September 15, 1941 and again at 3 P.M. March 5, 1942. On each of the two last occasions they

were secured in a cedar post trap. Are these birds a mated pair?—KATHERINE G. HARDING, Cohasset, Mass.

Attempt to Increase Number of Eggs in Clutch of Bluebird.—The following experiment was carried out at Brooks School, North Andover, Massachusetts, in order to determine whether an Eastern Bluebird (*Sialia s. sialis*) could be induced to lay more than the number of eggs which it has been known to lay. Forbush, ("Birds of Massachusetts and Other New England States", 1929, 3 : 419) gives the number as "3 to 7, usually 4 or 5."

On April 30, 1942, of two eggs in Box 14, I removed one and marked with a pencil the remaining egg. On the following day, May 1, there were three warm eggs in the box, so I removed two, again marking the egg left in the box. It should be noted here that one egg was left in the nest at all times to encourage the female to continue laying. On May 2 there was in the box only the one marked egg. However, on the following day, May 3, there were two cold eggs, so I removed the marked one. For the next two days the one lone egg remained, and there was no sign of the presence of the parents. On May 6 I removed the nest and the remaining egg from the box, for it was obvious that the nest had been abandoned. A total of five eggs was laid.—FRANCIS P. NASH, JR., Brooks School, North Andover, Massachusetts.

Repeats on Banded English Sparrows.—Between April 26 and July 24, 1941, ninety-nine English Sparrows (*Passer domesticus*) were trapped and banded. They were captured in an ordinary sparrow trap placed on the roof of McGilvrey Hall, Kent State University, Kent, Ohio. Fifteen repeats involving eleven different birds were recorded. Eight were captured twice, two were taken three times, and one trapped five times (three repeats). The number of repeats would indicate that the English sparrow population was a local one living within a small range. An average of 3.9 individuals were trapped each time birds were found in the trap.

Band No.	*Dates of Capture*
120994	5/12—5/15
136157	5/12—6/1
120995	5/12—7/19
120991	5/19—6/23
39-141517	6/7 —6/9
39-193327	7/3 —7/4
39-193334	7/5 —7/11
39-193331	7/5 —7/19
39-141512	6/7 —6/9 —6/27
39-193324	7/2 —7/4 —7/5
39-199841	6/10—6/13—6/27—6/30 (at 10:30 A.M. and 5 P.M.)

Trapping operations were resumed in late September but no English Sparrows were captured before November 11. Until that time the birds ignored the trap and bait. After the eleventh the birds consumed the bait in front of the trap but for the most part would not enter it. A few entered the first compartment but managed to escape through the entrance. Two more were trapped on November 16. For some time after that no other birds were captured. They were seen around the trap but would not enter or escaped from the first compartment. The trap was discontinued in early December.—RALPH W. DEXTER, Kent State University, Kent, Ohio.

A Purple Finch Recovery.—On January 23, 1938 Roger Branham banded a male Purple Finch at Hingham, Mass., applying band No. 37-140424. The bird was recovered by me April 7, 1941 at Cohasset, Mass. This is the first bird ever recovered at our station from a neighboring town.—KATHERINE G. HARDING, Cohasset, Mass.

Two Records of Crippled Birds.—In trapping sparrows on the roof of

McGilvrey Hall on the campus of Kent State University, Kent, Ohio, the writer captured a male English Sparrow (*Passer domesticus domesticus* L.) which had the left leg broken off at the end of the tibia. The bird was trapped on June 15, 1941, in an ordinary sparrow trap with five other English sparrows and was banded with Biol. Surv. band 136169. In the trap the crippled bird seemed to get around and feed without difficulty and to compete successfully with the other birds. The following spring this bird returned, and was found dead in the trap on May 14, 1942.

While studying marine life at Cape Ann, Massachusetts, in the summer of 1936, the writer observed a mature Herring Gull (*Larus argentatus smithsonianus* Coues) with a single leg. The left leg was broken off close to the body. At first the bird appeared to be simply standing on one leg, but continued observation showed the left leg to be missing. The bird was seen in a small flock on an exposed sandy-mud bar in a tidal inlet, and was later observed on this bar on several different occasions.—Ralph W. Dexter, Kent State University, Kent, Ohio.

Sex Ratios.—The following data have been compiled from the records of the Summerville, South Carolina, station of William P. Wharton, who presented a summary report of the results of twelve years of banding in South Carolina in the October, 1941, issue of Bird Banding (XII: 137-147). Sex ratio figures were easily accessible only for the years 1931-1937, and for the species here listed, during which period a total of 8,743 birds was banded, and a total of 1,564 return records made, a percentage of 17.88.

Table I

Sex Ratios Complied From Birds Banded at Summerville, S. C. 1931-1937

	Male	*Female*
White-breasted Nuthatch	7	1
Red-breasted Nuthatch	1	1
Golden-crowned Kinglet	–	1
Ruby-crowned Kinglet	13	5
Red-winged Blackbird	18	8
Cowbird	57	32
Cardinal	124	119
Red-eyed Towhee	190	130
White-eyed Towhee	58	51
Totals	468	348

Table II

Sex Ratios Compiled From Return Records—Summerville, S. C. 1931-1937

	Male	*Female*
Cardinal	20	19
Red-eyed Towhee	48	23
White-eyed Towhee	17	9
Totals	85	51

The above tables seem to contain a few items of significance. Ignoring those species banded in small numbers, the most striking one seems to be the more balanced sex ratios in Table I of the resident species, as compared to the migratory ones.

The difference in the two tables in the ratios for the White-eyed Towhee is interesting. The figures in Table I, from new bandings, can be assumed to represent, in a large proportion, birds of the year. Those in Table II represent birds nearing two years old and older. While the first group is in good balance, the second group, composed of older birds present on the area during the winter, shows nearly two males for each female. The Cardinal, on the other hand, maintains its remarkably balanced sex ratio in both tables.

The figures for the Red-eyed Towhee in Table II, also show a shrinkage among the older birds in the ratio of females to males.

Obviously the above items cannot be fully interpreted. They refer only to one locality. They do, however, cause speculation as to which factors in the life histories of the species referred to, perhaps ones connected with their breeding habits, are responsible for the differences in sex ratios noted.—EDWIN A. MASON, Wharton Bird Banding Station, Groton, Massachusetts.

RECENT LITERATURE

Reviews by Margaret M. Nice

BANDING

1. Bird Banding Notes. 1942. Vol. 3, No. 4 : 57–66. Fish and Wildlife Service, Washington, D. C. Due to the difficulty of obtaining aluminum, no new permits for banding are being issued, and the banding of colony birds is discouraged. Experiments are being made with cellulose-acetate plastic for bands of sizes 5–8. During 1940 428,185 birds were banded, during 1941, 357,174, the total since 1920 coming to 4,069,501. Species banded in the greatest numbers were: Chimney Swifts, Mallards, Common Terns, Pintails, Juncos, White-throated Sparrows, Herring Gulls, Grackles, Starlings, Song Sparrows, Robins, Purple Finches and Redwings.

2. Migration of the Tricolored Red-wing in Central California. Johnson A. Neff. 1942. *Condor*, 44 : 45–53. *Agelaius tricolor* is "a species of gregarious and erratic habits", largely confined to California. Between 1924 and 1940, 19,700 were banded. There have been 93 recoveries, i.e., 0.47 per cent. These show a northwestward movement after nesting to coastal farming areas and rice-growing districts. The oldest bird reached 6½ years. Blackbird damage to rice and other grain crops has decreased since 1932.

Banding was also used in Numbers 3, 4, 14 and 15.

LIFE HISTORY

3. Supplementary Notes on the Royal Albatross. L. E. Richdale. 1942. *Emu*, 41 : 169–184, 253–264. Information on four seasons since the author's first paper (1939, *Emu*, 38 : 467). Six pairs of *Diomedea epomophora sanfordi* were banded with aluminum and colored bands. Faithfulness to mate and nesting site was found to be the rule. If a chick is raised one year, the parents take a year off before returning, nesting every other year. The egg is laid in November, it is hatched after 77–80 days, and the young bird is fledged in late September. If the egg or chick is lost, parents return the following fall; one pair that lost their chick in late March "returned after six months' freedom." One pair have been together since 1935, one since 1937, three since 1938. One female lost her mate and apparently was "forming a new alliance", (p. 180). With each pair "the female always had a much darker crown than the male."

At one nest the male sat on the eggs from 4 to 14 days at a time, 43 days in all, while his mate sat for 3 to 10 days, totalling 36. At another nest the female's periods lasted from 3 to 10 days, the male's from 3 to 5. At still another the female sat from 1 to 5 days, the male from 1 to 3. The chick takes three days to hatch. Spells at the nest shorten after hatching, none being over 5 days. These young are not deserted before they are fledged as in the case with some birds of this family, but smaller meals are given near the last and the young lose some of their extra weight. An admirable study based on the use of colored and aluminum bands.

4. Blue and Lesser Snow Geese on Southampton and Baffin Islands. T. H. Manning. 1942. *Auk*, 59 : 158–175. For every 40 pairs of Snow Geese (*Chen h. hyperborea*) on Southampton Island, there were one pair of Blue Geese (*Chen caerulescens*) and 2 or 3 mixed pairs. The geese and Herring Gulls (*Larus argentatus*) nest peaceably side by side, although the geese drive strange gulls away from their eggs. The female incubates, while the male stands guard. Adults are very fat on arrival, but lose all their fat while caring for the eggs. The author thinks "the female seldom or never leaves the nest" to eat! (p. 163.) Incubation lasts 22–23 days. As soon as the young are strong enough to follow, the parents leave and join other bands of geese. Many young are lost; some are adopted by other families. "If I picked up one of these lost birds or stopped to examine it, it would thereafter follow me as readily as its parent." Of 72 downy Snow Geese banded in 1934, 22 have been recovered—a shockingly high proportion. Fifteen of these were shot in Texas. No yearling geese are present in the nesting colonies. The author believes that Blue and Lesser Snow Geese are subspecies of one species.

5. Further Contributions to the Ornithology of the Seychelles Islands. D. Vesey-Fitzgerald. 1941. *Ibis*, 14th ser., 5 : 518–531. Great numbers of eggs are taken commercially from these islands north of Madagascar; one of the chief victims is the Wideawake Tern (*Sterna fuscata*). It arrives in May during the season of the monsoons. When a male starts to copulate, "every other male in the immediate vicinity will join in until there is a heap of fluttering birds. This 'treading' of the females on the breeding grounds has more the appearance of excited play than the actual act of copulation", (p. 523). One egg is laid; incubation lasts a month; the young can fly at two months. If breeding is too long delayed by egg-collecting, the birds suffer greatly from the heat and the young die. "When the birds are closely packed together they protect their eggs with much vigour if danger threatens. . . . When the birds nest in reduced numbers and are unable to suppress the vegetation, numbers become strangled in the trailing vines of *Cassytha* sp." (p. 525).

Frigate-birds "appear to be entirely dependent on Booby colonies for their food," (p. 520.) Red-footed Boobies (*Sula sula sula*) nest amicably with *Fregata minor aldabrensis* and *F. ariel iredalei*, but "in the air there are continual skirmishes between the two species."

White Terns (*Gygis alba monte*) are abundant and tame, and "nest in the houses." The single egg is laid on branches of trees and is not stuck on. The author replaced one with the larger egg of a Wideawake Tern; "the foster parent never dislodged" it, but the chick "was quite unable to retain its perch," (p. 530).

6. Night Desertion by Nesting Common Terns. Nelson Marshall. 1942. *Wilson Bulletin*, 54 : 25–31. Recently there has been wide-spread nesting failure among the colonies of *Sterna h. hirundo* on the islands of western Lake Erie. Many times the nesting terns deserted Starve Island about a half hour after sunset and returned from an hour to a half hour before sunrise. Daytime behavior was normal. "The underlying causes for this lapse in attentiveness, which has been studied during the past three seasons, are as yet unknown. Accompanying it there have been repeated, complete nesting failures, contrasting with reports of past success." Black-crowned Night Herons (*Nycticorax n. hoactli*) eat "eggs from unattended nests during the night", but quickly retreat "from attacks of the defending terns when the colony is well attended."

7. The Breeding Biology of *Micropus caffer streubelii* Hartlaub, the White-rumped Swift. R. E. Moreau. 1942. *Ibis*, 14th ser., 6 : 27–49. A fine study based on 1,100 hours of records made by Africans, most of them from dawn to dusk. The swifts nest on buildings of the Amani Research Station in Tanganyika Territory. They never build their own nests, but use for the most part the retort-shaped nests of *Hirundo abyssinicus*; they stick feathers over the interior of the swallow nests, gumming them together with much saliva. The

swallows spend a long time making the nest, but only get to raise one brood in it; the swifts use them for many years, one particular nest having had over 25 sets laid in it from 1929 to 1941. They lay between September and March, each nest housing three broods each season. From laying of the eggs to leaving of the young takes 9 weeks; it is probable that the same birds raise all three broods. They may copulate in the air; twice they were seen doing so at the nest entrance. Two eggs are laid; nesting success amounted to 75 per cent of the eggs laid. Of 97 eggs, 86 hatched and 74 young were fledged. The European Swift (*Micropus a. apus*) lays three eggs and is single-brooded; it has a long migration and risks dangers of hunger and cold. The Amani *Micropus*, sedentary and sheltered, has a much higher "biotic potential"; perhaps a shortage of swallows' nests is a limiting factor, or there may be more non-breeding birds than with the European Swift.

Eggs are laid 48 hours apart; incubation lasts about 21 days. Both parents incubate. All day observations showed eggs were covered from 17 to 90 per cent of the time with no correlation with rainfall or air temperature. The nest is a good heat-insulator. Thirty-one per cent of the absences lasted over an hour; the longest intervals at 7 nests lasted from 104–386 minutes. This last record took place the day before hatching. The birds may stay away practically all morning. One bird sat from 6 A.M. to 1 P. M., "then no bird entered till they came to roost." Forty-five of the periods on the nest lasted over an hour, 11 were over 2 hours and 7 were over 3 hours each.

Fledging takes 35–47 days, averaging 42 days. At first the young were treated like the eggs so far as brooding went; infants less than 24 hours old were brooded one minute in 5 hours; when 5 days old they were left for $3\frac{1}{2}$ hours; from the 8th to 12th day they were covered 40-50 per cent of the time. A single young may be fed only 4 times a day! Where two were present, the average rate for 200 minutes ranged from 1.2–1.8, the average being 1.5. It is a great pity the author does not give us, besides these 200 minute records, the *all day records*. No one but Mr. Moreau uses this 200 minute unit; when he had the all day records, he should have included them.

The young are hatched naked; they have strong claws and are active and muscular from hatching, "crawling and climbing readily." They twitter when fed from the day of hatching. They defecate out of the nest at about the 10th day and their eyes are fully open at 15 days. They leave with no coaxing, flying strongly. They may leave in the absence of the parent.

8. Observations on Black Redstarts Breeding in London, 1941. C. B. Ashby. 1942. *British Birds*, 35 : 201–205. A pair of *Phoenicurus ochra gibraltariensis* nested in a private garden on a building damaged by air raids. They raised one brood, and on July 4 the female was sitting again. Both parents fed the second brood equally. A second cock in better plumage appeared and helped feed and clean the nest. The parents were not hostile but were disturbed, and "their efficiency in feeding the nestlings was impaired." The young left at 17 days and the female cared for them for about 12 days longer.

9. Field Observations on the Breeding Biology of the Yellow Wagtail. Stuart Smith. 1942. *British Birds*, 35 : 186–189. An excellent account of *Motacilla flava flavissima* with much information given in small compass. Family parties "keep together during the summer." "Cocks do not begin to adopt a territory until the arrival of the hens." Then there is much fighting. "Aggressive display takes the form of puffing out the breast to display the yellow under-parts, the bird meanwhile sitting back on its tail with head held erect and body stiff; very similar in appearance to a miniature pouter pigeon." The female joins the

fighting when another pair trespasses. The female builds alone, sometimes going a half mile for material. Both parents incubate and feed. The bird returning to incubate always calls the sitting mate. Data on 8 nests show incubation of the 5–6 eggs to last 12–13 days; fledging lasts 10–11 days.

10. The European Starling in California. Stanley G. Jewett. 1942. *Condor*, 44 : 79. The first record of *Sturnus vulgaris* on the western coast occurred January 10, 1942 when a male was collected from a flight of about 40. Thus in half a century the descendants of the 120 birds released in New York City in 1890 and 1891 have conquered the continent.

11. Breeding Activities of Three Common Species. N. L. Roberts. 1942. *Emu*, 41 : 185–194. Three pairs of birds nested in the same bluegum at the same time: Restless Flycatcher (*Seisura inquieta*), Magpie Lark (*Grallina cyanoleuca*), and Willie Wagtail (*Rhipidura leucophrys*). With the flycatchers, both birds built, both incubated and both fed the young. The female was on and off the nest 4 times in 23 minutes; both left the nest "to chase intruders or to snap up passing insects." The Magpie Larks fed young of a previous brood while they incubated. The parents alternated on the nest, averaging 17.2 minutes at a time. If the incubating bird was unwilling to leave, "a peck was administered." Both Wagtails incubated and also fed young of an earlier brood. "The sitting bird frequently flew off to chase the Magpies [*Gymnorhina tibicen* nesting near] and to pursue and catch insects." These birds showed "illness-feigning" when the young were approached by the author. Wagtails and Magpie Larks often nest in the same tree. All three species drove a cuckoo (*Cuculus pallidus*) out of the tree, the Wagtails being the most aggressive. All three were territorial and all respected each other's territories within the tree! Song was used to warn off trespassers, to keep the pair together, and, after the young had left the nest, to keep the family together.

BIRD BEHAVIOR

12. The "Injury-feigning" Behavior of the Florida Nighthawk. Ivan R. Tompkins. 1942. *Wilson Bulletin*, 54 : 43–49. Only the female *Chordeiles minor chapmani* was found covering eggs or young in the daytime. The spectacular nest-protecting display is described and illustrated with photographs. Young will go through part of the display from the age of 4–5 days; they "will open their mouths, spread wings (and tail when partly fledged) and hiss at the intruder, often lunging forward to bite at an extended finger." The author discusses the pertinent literature and rightly concludes that this behavior is instinctive.

13. Further Analysis of the Social Behavior of the Black-crowned Night Heron. G. K. Noble and M. Wurm. 1942. *Auk*, 59 : 205–224. Plumes of the male *Nycticorax n. hoactli* "serve to emphasize the overture and display ceremony which aids the formation of nuptial bonds. Removal of the plumes weakens the bonds, the pairs tend to disintegrate." "The rosy leg color of the breeding night heron serves to emphasize the leg movement of the snap-hiss ceremony. Coloring the legs blue-green has no effect on the speed of pair formation or on the duration of the bond." However, Allen and Mangels (1940) found that *in the wild* males paid no attention to females with pale legs, but courted those with red legs.

The guttural sex call, even in young birds treated with testosterone propionate, induced "food-begging behavior in untreated birds." Between pairs of adults, the one that first loses its nuptial color and voice may give the food-begging behavior to its mate, but it is not fed. It is difficult to know how much dependence to place upon these reactions of birds in crowded conditions in captivity. Certainly they should be checked by observations in the field.

14. Notes on the Social Behaviour of Blue Tits. M. K. Colquhown. 1942. *British Birds*, 35 : 234–240. Observations on over 70 color-ringed *Parus caeruleus obscurus*, "among which six pairs were known to have bred successfully during 1938 and 1939." Five hundred contacts were recorded. "In winter, it is difficult to tell whether a bird is paired or not; the most certain way is to watch the roost. Paired Blue Tits do not roost communally, but very often roost close to each other, while they indulge in a 'good-night' display which probably has considerable social significance in maintaining the relationship." This occurs in November and December and in spring. The female goes to roost before the male. There is a mutual roosting flight, a chase during which the male sings; he visits his mate's site and roosts nearby. He gives "an alarm note on the slightest approach of danger."

"Blue Tit combat is psychological, and not physical." "Dominance is so dependent on the territorial position at the moment of reaction and on the endocrine balance of the individual that even interspecific variations occur." "A Blue Tit seems to recognize an individual before we can determine the species." A tit dominated by another "would sometimes turn on one or more tits who were its social inferiors and threaten them, while a tit low in the social hierarchy has been seen to show extreme viciousness when it chanced on a tit that it could dominate." "G Y was usually dominant over GG [his mate] through the winter . . . in early February . . . she definitely became the despot for a few consecutive days"; later "he resumed dominancy." In a flock "residents are dominant to nomads and the social order of the residents is related to territory."

15. Dominance in Winter Flocks of Chickadees. Frances Hamerstrom. 1942. *Wilson Bulletin*, 54 : 32–42. Observations on *Penthestes atricapillus* at feeding stations in Wisconsin; the birds were color-banded and also marked with colored tail feathers. No change in behavior was observed by the imping of colored feathers in tails of Chickadees, Blue Jays, White-breasted Nuthatches and House Wrens. "Increase in size of a winter flock is determined not only by conditions at the moment, but also by what food was available in the preceding few winters . . . Chickadees come into a new territory slowly—too slowly to fill it in one year. . . . I suspect that the key lies in tradition. Instead of reflecting this random building up from a fresh start, the territory begins its second winter with a nucleus of old-timers." Charts are given of the results of fights. "Dominance is not linear, but is practically uni-lateral (one reversal in 76 fights.)" "Old-timers appeared to have the advantage in their early encounters with new-comers." It is likely that "intolerance towards new-comers appears only in the larger flocks." All fights were about food. New-comers showed uncertainty in their behavior and this "may have caused the others to pick on him." A bird with a crippled leg was high in dominance.

16. Group Organization Among Vertebrates. W. C. Allee. 1942. *Science*, 56 : 289–293. "Dominance-subordination patterns of behavior may be based on the recognition of other members of the flock as individuals to which a proper reaction must be made. . . . Opposed to this is a type of impersonal behavior patterns such as is found in many of the groups of mice which have been studied in our laboratory. Impersonal group organization depends upon a kind of unoriented, generalized aggressiveness brought in contact with similarly unoriented lack of aggressiveness." The "moving territory" found by Dale Jenkins with a Blue Goose family is mentioned. Hens high in the peck-order lay more eggs than do their inferiors; subordinate cocks may not be allowed to tread. Of course, these phenomena take place under highly artificial conditions. The author concludes: "the dominance-subordination pattern of group behavior may be influenced by environmental factors and may have its foundation in (a)

heredity . . . (b) in the physiological state of the individual . . . (c) on experience," (p. 293).

17. The Mute Swan and the 20-10 Seconds Rule. J. M. Dewar. *British Birds*, 35 : 224–226. "British diving birds with one exception as far as is known, follow the rule of 20 seconds for the first fathom of depth of water and 10 seconds for every fathom thereafter." "The exception is the Coot which follows a 10–10 seconds rule." The 20–10 rule has been found to hold for ducks, grebes, cormorants and Alcidae. It applies to depths from 3–21 feet; at less than 3 feet the timing is correspondingly shorter.

18. Mating a Blond Ring-Dove with Two Females Simultaneously. Dorothea Ewers. 1942. *Journ. Comp. Psych.*, 33 : 75–86. A detailed account of behavior; when the females had separate nests, the male spent the morning on one and the afternoon on the other, his mates adjusting themselves to his behavior. Later one nest was used, and although the females pecked each other, they incubated and brooded side by side.

19. Curious Story of a Lyrebird. A. G. Campbell. 1942. *Emu*, 41 : 265–267. The same tame *Menura novae-hollandiae* described in the *Emu* 40 : 357 (see *Bird-Banding*, July, 1941, No. 18) occasionally visited a mirror set up outdoors; he gave strange calls, attacked the mirror and displayed before it, singing his own song and giving many imitations. In the forest he "was much interested in logs I turned over as new feeding places. When offered new food, such as dried grubs or dead beetles, he had a way of pinching or tasting them first before swallowing."

20. Food-Offering and Copulation by European Roller in Winter Quarters. R. E. and W. M. Moreau. 1941. *Ibis*, 14th ser., 5 : 614. A pair of *Coracias garrulus* were following each other about on February 21. On March 25 one fed the other with a grasshopper, then mounted. They left that day. They nest 3,000 miles to the north of Tanganyika Territory, and egg-laying would not take place for at least 3 weeks.

21. Piracy by *Lanius collurio humeralis*. R. E. and W. M. Moreau. 1941. *Ibis*, 14th ser., 5 : 614–615. A Fiscal Shrike was observed swooping at a roller, and making it drop grasshoppers.

22. Birds Eating a "Distasteful" Grasshopper. R. E. and W. M. Moreau. 1941. *Ibis*, 14th ser., 5 : 615. The Stink-grasshopper (*Zonoceros elegans*) is brightly colored, slow-moving, and has a horrible pungent odor. A monkey would not touch it, nor do poultry nor most birds. A Bulbul (*Pycnonotus tricolor*) sometimes eats it and the same was true of the wintering roller. But the Fiscal Shrike had no interest in making it drop one of these for it (the shrike).

23. Blue Jay: Brigand or Benefactor? What Did the Blue Jay Do with the Nut? Arnold Gesell. 1940. *Scientific Monthly*, 50 : 540–543. A resumé of experiences of correspondents mostly relating to the robbing of squirrels by *Cyanocitta cristata*. Nuts buried by both play a role in reforestation. Blue Jays are a pest in pecan orchards, but in Walker County, Texas the particles of acorns they drop form an important food for Bobwhite (*Colinus virginianus*). The psychological implications of the relationship between the jay and the squirrel are of considerable interest.

24. The Usurpation of Nests, Nesting Sites and Materials. Norman Favaloro. 1942. *Emu*, 42 : 268–276. Many instances are given of Australian

birds appropriating other nests while in use, utilizing old nests, or competing for hollows, in which case mixed clutches may occur. "Increasing numbers of House Sparrows and Starlings seriously interfere with the natural nesting of many of our birds," (p. 274).

25. Nest "Borrowing" Amongst Birds. P. A. Bourke. 1942. *Emu*, 41 : 277–278. Several species "regularly re-line deserted nests of other species and use them to rear their own broods." Instances are given of birds driving off the rightful owners.

26. Egg-shell Disposal by Birds. C. and D. Nethersole-Thompson, 1942. *British Birds*, 35 : 162–169, 190–200, 214–223, 241–250. A study of "how, when and why [does] the egg-shell lose its status to become a redundant, if not undesirable, body in the nest, and the part played by each sex respectively in its disposal," p. 163. Bill-rinsing after shell-disposal has been seen in the Golden Plover, Greenshank, Common Curlew and Oyster-catcher. One Greenshank brooded empty egg-shells; others have carried out every imaginable manner of disposal. A European Kingfisher carried shell fragments in beak and claws at the same trip. A Red-backed Shrike "pinned a large shell-fragment in the 'larder' on a blackthorn!" (p. 191). For species in the British List, observations are given in detail, both published and unpublished records.

POPULATION STUDIES

27. The Breeding Distribution, History and Population of the Fulmar (*Fulmarus glacialis*) in the British Isles. James Fisher and George Waterson. 1941. *Journal of Animal Ecology*, 10 : 204–273. Another admirable cooperative study of the British Trust for Ornithology. This is a thoroughly documented account (with 800 references) of the spectacular spread of the Fulmar, which until 1878 bred only on St. Kilda in the British Isles. The St. Kilda population has probably remained stationary at 21,000 pairs. "Since 1877 the population outside St. Kilda has increased from 0 to about 40,500 breeding pairs, nesting in 208 colonies in 1939", besides "61 other colonies at which breeding had not yet been proved," (p. 156).

Darling's theory of the socially stimulating effect of numbers appears to be supported by the Fulmar: no breeding takes place below a certain limit; in large colonies birds arrive earlier, lay earlier and raise more young than do those in small colonies. *How great an effect age plays is not known*, but "Members of small, new colonies are probably young birds," p. 261. "The Fulmar feeds on plankton and any oily matter it can get." "There are no predators on the Atlantic Fulmar save man," (p. 261).

28. Eastern Population of the Duck Hawk. J. J. Hickey. 1942. *Auk*, 59 : 176–204. An admirable study involving a deal of field work and of letter-writing. Breeding-sites of *Falco peregrinus anatum* are marked by permanency. A census of nests east of the Rockies shows 408 eyries of which 275 (67%) are in the United States, a proportion that probably reflects intensity of field work. There has been at least an 11 per cent decline in recent years, not counting a tree nesting population that has disappeared. Nesting sites are *rocky cliffs*, cut banks, gigantic trees in the Mississippi Valley before 1880, occasionally skyscrapers, The distribution of the Peregrine depends on physiography; the height of the cliff affords "isolation and protection from enemies" and thus corresponds to "cover" with other birds. There seems to be an "absolute requirement" in respect to the nest-site, viz. a hollow scraped out of dirt or gravel.

As to territorial competition, the male defends the "immediate vicinity of the

nest site" from Peregrines not his mate. "Records of males defending territory against females are rarely found in the literature of any species," p. 181. Females defend the eyries from other females. The maximum density was 5 pairs on 7 miles of escarpment. The normal set consists of 4 eggs, the average number of young is three. Around New York City at 19 eyries an average of 1.1 birds were fledged in 1939 (a normal year) and 1940 (subnormal year). There were 3 year-old females that were mated, but failed to lay; two two-year old females laid two eggs each. Some females "fail to lay year after year. This situation seems to hold at one eyrie for most of the last ten years, and it is unquestionably true at two other sites from at least 1938 to 1940 inclusive. In each case, courtship by the male lasted at least one month past the normal period", (p. 192).

"Man is the adult Peregrine's worst enemy. Birds are shot at all seasons, in States that protect them as well as in those that do not, on private lands and on public reservations," (p. 192). The menace from egg collecting has decreased, but falconers constitute a new difficulty. A very interesting discussion follows on "The Nest Site as an Ecological Magnet." "*First-class Peregrine cliffs* are *extremely high*. These so attract this species in the breeding season that Peregrines will apparently occupy them *no matter how many 'nests' are broken up or adult birds destroyed*," (p. 196). "Gaps in population are filled according to each eyrie's value as an ecological magnet. Pairing in the Peregrine Falcon is not based on sexual selection but rather on the selection of a nesting territory." "Breeding distribution and density are found to be affected by (1) the number of cliffs and cut-banks that still afford isolation and proper eggs sites, and (2) by territorial competition," (p. 202).

A number of recommendations are made: call the bird the American Peregrine; give it legal protection; interest owners of nesting sites; keep away picnickers; watch game wardens; supervise falconers; and, in the case of skyscrapers, church spires, high bridges and large gas tanks, add some sort of protection and a box of gravel for nesting purposes.

29. The Index of Heron Population, 1941. W. B. Alexander. 1942. *British Birds*, 35 : 210–213. A summary of 132 reports on *Ardea cinerea* in the British Isles. "No reports have reached us of unusual mortality during the winter, but the effect of war conditions is reflected in the number of instances where decrease or disappearance of heronries is attributed to tree felling. In one case it is thought that Herons may have deserted their nests owing to heath-fires started by bombs, but in a heronry near London the numbers nesting were up to the average in spite of the din of anti-aircraft batteries at night." "No recovery of the Heron population from the serious setback sustained in 1940 has yet occurred. On the contrary there has been a small further decrease."

30. Fourth Census of Non-Passerine Birds in the Bird Sanctuaries of the North Shore of the Gulf of St. Lawrence. H. F. Lewis. 1942. *Canadian Field-Naturalist*, 56 : 5–8. A total of 109,584 non-passerines was counted in ten sanctuaries in 1940, a loss of 2 per cent over 1935, due largely to unexplained decrease of 13,000 out of 62,000 Atlantic Puffins (*Fratercula a. arctica*). Eiders were driven off one island by the presence of a fox. Great Black-backed Gulls (*Larus marinus*) have increased despite control measures of destroying eggs and nests—67 per cent from 1935 to 1940. This species and the Herring Gull (*Larus argentatus*) have nearly quadrupled their numbers between 1925 and 1940. The Black-back preys on eggs and young of other birds, particularly of the Southern Eider (*Somateria mollissima dresseri*).

31. On the Analysis of Productivity in Populations of the Higher Vertebrates. Paul L. Errington. 1942. *Journal of Wildlife Management*,

6 : 165–181. An examination of "compensatory reproduction" in game birds that normally rear one brood a season. With muskrats it was found that "some of the heaviest losses follow, instead of govern, the directions taken by populat on curves. Lessening of juvenile mortality from predation and disease tended to be counterbalanced by increased killing of young by older muskrats. Conversely, when predation or disease losses were heavy, muskrat intraspecific attacks tended to diminish in proportion," pp. 178–9. "Some degree of increased breeding as a result of losses of eggs or of young can be expected for a considerable variety of higher vertebrates, and an analysis of productivity of a hypothetical species (similar in behavior to the ring-necked pheasant) is outlined as an illustration of technique," (p. 179).

ECOLOGY

32. Life Zones, Biomes, or Life Forms? R. T. Peterson. 1942. *Audubon Mag.*, (formerly *Bird-Lore*), 44 : 21–30. An illuminating discussion of Merriam's 'life zones', Shelford's 'biomes', and 'life forms' or habitat niches. "The biome seems scarcely more satisfactory than the life zone in describing bird distribution, and . . . most land birds appear to conform much more readily to the physical aspect of the vegetation, of *'life form'* as some authorshave called it," (p. 25). The breeding population of Hog Island is discussed as an example of spruce climax. The author summarizes his findings thus:

> "1. The biome, although a logical concept as regards plants, is not much more satisfactory than the life zone in describing bird distribution except in the climaxes. 2. Birds that occupy the developmental stages of a biome are often found in other biomes as well. This is because the vegetational forms that compose these stages can often be duplicated in other biomes. 3. Birds that occupy the climax growth of a biome are most frequently restricted to that biome and are an indicator of it. This is because the vegetational forms that make up the climax growth are often peculiar only to that one biome. 4 Birds appear to fit the life-zone concept best in climax growths in those areas (Arctic-Alpine, Hudsonian, Canadian, etc.) where temperature coincidentally agrees with vegetation. 5. The physical aspect of the environment, which has also been called the niche, or life form, seems to be the most important factor influencing bird distribution, and this is further modified variously by climate, geographic barriers, competition with similar species of birds, population pressures, historic factors, and probably by many less tangible influences," (p.30).

33. Adaptive Coloration in a Single Faunal Association. T. H. Eaton, Jr. 1941. *Journ. Washington Acad. Sci.*, 31 : 129–135. An interesting account of the amazing array of "color adaptations among rain-forest animals" on Barro Colorado.

34. Predator Control in Southeastern Quail Management. H. L. Stoddard and E. V. Komareck. 1941. *Trans. 6th No. Am. Wildlife Conf.*, 288–293. Recommendations "to quail preserve owners that they conduct routine control of foxes, opossums, skunks, house cats, and cur dogs—preferably by night hunting." Keep wild fur-bearers' numbers "normal." Do not destroy owls or hawks except Accipiters. Buteos eat snakes that eat quail eggs. Wild Turkeys destroy quail eggs and young. "Destruction by stray cats is sometimes very serious in the case of nesting birds. The house cat is one of the few creatures that has the ability to spring on the bird during incubation and kill it." Cats are attracted by the calls of the hatching chicks.

35. The Carrying Capacity of Southeastern Quail Lands. H. L. Stoddard and E. V. Komarek. 1941. *Trans. 6th No. Am. Wildlife Conf.*, 148–155. Many factors have to be taken into consideration. It takes 10,000 acres to produce a kill of 1,000 Bobwhite. The total population averages one bird to 2–4 acres, or 2,500 to 5,000 on the 10,000 acres. This would mean from one-fifth to two-fifths of the fall population would be shot.

36. Possible Temperature Factors in North Central Pheasant Distribution. R. Bennitt and H. V. Terrill. 1940. *Trans. 5th No. Am. Wildlife Conf.*, 428–432. In the Midwest Ringneck Pheasants have failed to establish themselves south of Ohio, central Illinois, southern Iowa and Nebraska and southwestern Kansas; the authors suggest that south of this line temperatures may rise too high for the eggs, and recommend this problem as a subject for study.

37. Wildlife Conservation and Geography. R. Bennitt. 1940. *Journal of Geography*, 34 : 217–225. The present trend is all to the increase of "lower" wildlife, such as carp, grasshoppers, House Sparrows and mice; we need definitely to work for the conservation of "higher" wildlife—bass, eagles, Prairie Chickens and deer. We need to study the different environments, keeping in mind Liebig's Law of the Minimum: "a species cannot increase beyond the limit set by the *least abundant* necessary factor in its environment," (p. 223).

38. A Study of the Birds of the Big Basin of California. Robt. T. Orr. 1942. *Am. Midland Naturalist*, 27 : 273–337. An ecological study of the birds of two Redwoods Parks in the Santa Cruz Mountains, and also of the coast which is privately owned. A total of 176 days was spent in the field. Eight major associations are described with the plants and birds typical of each. An annotated list of the birds is given in which only binomials appear; habitat and food preferences are noted as well as nesting data and relations with other bird species.

BIRDS AND THEIR FOOD

39. Bobwhite Foods and Conservation Farming. Verne E. Davison. 1942. *Journal of Wildlife Management*, 6 : 97–109. Practical suggestions for producing food and shelter for *Colinus virginianus*.

40. A Three-Year Trial with a Feed Patch for Song Birds. Geo. J. Wallace. 1942. *Journal of Wildlife Management*, 6 : 110–117. Millet and sunflower planted on $1\frac{1}{2}$ acres attracted migrating fringillids, especially Indigo Buntings (*Passerina cyanea*) in the fall.

41. The Food of the Blackbird (*Turdus merula* L.) in Successive Years. W. E. Collinge. 1941. *Ibis*, 14th ser., 5 : 610–613. Beneficial in England when not too numerous; often too abundant in fruit-growing districts.

PARASITES, ECOLOGY AND CLASSIFICATION

42. The Parasite Fauna of the White Stork and its Relationships to the Problems of Ecology, Phylogeny and the Original Home of the Storks. (Die Parasitenfauna des weissen Storches und ihre Beziehungen zu Fragen der Oekologie, Phylogenie und der Urheimat der Störche.) L. Szidat. 1940. *Zeits. f. Parasitenkunde*, 11 : 563–592. Internal parasites of the Gray Heron (*Ardea cinerea*) are not at all like those of the Storks—either White (*Ciconia ciconia*) or Black (*C. nigra*). The Trematodes of European Storks are related to the Trematodes of South Africa. The author believes that storks originated in central Africa and herons in South America. He mentions Wegener's theory that America and southern Europe and Africa were joined at the beginning of the Tertiary.

43. The Mallophaga as an Aid to the Classification of Birds. G. H. E. Hopkins. 1942. *Ibis*, 14 ser., 6 : 94–106. Mallophaga "pass their entire life on the body of their host, transferring from one individual to another only when these come into close contact," (p. 94.) "As their hosts have evolved, the Mallophaga have evolved also, but more slowly. Since their environment is extremely uniform, their evolution has evolved more slowly than that of their hosts." Host-relationships are "highly specific," (p. 96.) If two groups of birds have three "genera of Mallophaga in common their close relationship is established," (p. 101). According to the author, a study of these external parasites shows that Flamingoes belong to the Anseriformes, that *Scopus* is nearer to the Charadriiformes than to the Storks, and that Bustards do not belong with the Gruiformes, but are an ancient and primitive group—Otidiformes—related to the Galliformes.

BOOKS

44. Ornithologists of the United States Army Medical Corps. Edgar E. Hume. 1942. Baltimore. Johns Hopkins Press. 583 pp. $5.00. This handsomely printed book with 110 illustrations gives fairly full biographies of 36 ornithologists connected with the United States Army Medical Corps. In the early days it was the custom for a surgeon-naturalist to be attached to major surveying parties sponsored by the government. Army posts in the West afforded opportunities for work in virgin country. We are told much of the professional—army and medical—lives of these men, some of it concerned with Indian fighting and the Civil War, as well as their natural history activities. Beside the most eminent ornithologists—Bendire, Coues, Cooper and Mearns—there are many less well known—Heerman, Kennerly, Merrill, Shufeldt, Casey, Woods and Woodhouse—, and finally a number whose bird interests were rather slight. We find fascinating reading of the early days of ornithology in this country, and many quotations from the writings of these naturalists. Besides the biographies, the book contains a foreword by Dr. Wetmore giving tribute to the influence of Baird in encouraging these young ornithologists, a conclusion telling of the many scientific contributions made by the Army Medical Corps, and a good index. A sidelight on the amount of labor entailed in the preparation of the volume is given by the sentence acknowledging indebtedness to those who furnished information; it extends for $4\frac{1}{2}$ pages—the longest sentence this reviewer has ever met. An excellent reference book for those interested in the history of ornithology.

45. Man Stands Alone. Julian Huxley. 1941. N. Y. Harpers. 300 pp. (The American edition of The Uniqueness of Man. London. Chatto and Windus.) A collection of 15 thought-provoking essays reprinted from various English and American journals. All are concerned with biology; some chiefly with birds, The Intelligence of Birds, The Courtship of Animals, The Way of the Dodo—; some with all life—The Size of Living Things, Origins of Species, and Mice and Men—; and some primarily with human beings—evolution, eugenics and social problems. The author is gifted with a happy way of presenting these fundamental problems clearly, simply and convincingly. "To a biologist who is not afraid of being a humanist as well, the essence of human life is seen in social relationships," (p. x).

NUMBERS OF BIRDS BANDED DURING THE GOVERNMENT FISCAL YEAR 1941

THE Fish and Wildlife Service has compiled the following list of individuals and cooperative stations that banded over 100 birds during the fiscal year July 1st 1940 to June 30, 1941. These lists were formerly published in BIRD-BANDING NOTES, issued by the Fish and Wildlife Service but for reasons of economy are now omitted.

Cooperative stations banding more than 5,000 birds:

E. A. McIlhenny, Avery Island, La.	31,809
O. L. Austin, North Eastham, Mass.	19,365
Ben B. Coffey, Jr., Memphis, Tenn.	9,689
Ducks Unlimited, Canada, Winnipeg, Man.	7,539
C. C. and F. E. Ludwig, Lansing, Mich.	7,511
Wm. P. Wharton, Groton, Mass.	7,157
Mrs. F. C. Laskey, Nashville, Tenn.	6,753
George C. Munro, Honolulu, Hawaii	5,217

Cooperators banding between 1,000 and 5,000 birds:

1. H. E. McArthur, Waukegan, Ill.	4,803
2. Mrs. Marie V. Beals, Elmhurst, N. Y.	4,488
3. Mrs. Ethel M. and Sears Crowell, Massachusetts and Ohio	4,253
4. Irvin S. Sturgis, Lexington, Mo.	4,138
5. Hugh S. Davis, Tulsa, Okla.	3,918
6. Gordon H. True, Jr., San Francisco, Calif.	3,407
7. Herbert H. Southam, Toronto, Ont.	3,101
8. Dr. Angus M. Woodbury, Salt Lake City, Utah	2,688
9. Revs. Edw. Stoehr and Fabian Kekich, Washington, D. C.	2,553
10. Mrs. Mabel T. Rogers, Milledgeville, Ga.	2,408
11. Ronald W. Smith, Kingston, Ont.	2,140
12. LeRoy Wilcox, Speonk, N. Y.	2,131
13. P. L. Hovey, Georgetown, S. C.	2,076
14. Prof. and Mrs. Henry Meyer, Knoxville, Tenn.	2,068
15. Gardiner Bump, Albany, N. Y.	1,965
16. Miss Louise J. Miller, Zion, Ill.	1,922
17. J. A. Hagar, Boston, Mass.	1,905
18. M. J. Magee, Sault Ste. Marie, Mich.	1,764
19. Preston F. Osborn, Lakin, Kans.	1,711
20. Robert E. Smith, Chicago, Ill.	1,700
21. Edward Kimball, Sanford, Fla.	1,695
22. Joseph A. Hines, Long Island City, N. Y.	1,641
23. Karl E. Bartel, Blue Island, Ill.	1,593
24. Howard H. Krug, Chesley, Ont.	1,537
25. Reed W. Ferris, Beaver, Ore.	1,509
26. Mrs. H. A. Drew, Barre, Vt.	1,508
27. B. S. Bowdish, Demarest, N. J.	1,485
28. Carl R. Warren, Ashland, Ohio	1,465
29. Stuart Criddle, Treesbank, Man.	1,457
30. Herbert Buckalew, Chincoteague, Va.	1,440

31.	Dr. Edmund Jurica, Lisle, Ill.	1,427
32.	Frederick C. Labahn, Jr., Blue Island, Ill.	1,412
33.	Horace Groskin, Ardmore, Pa.	1,405
34.	L. B. Fletcher, Boston, Mass.	1,400
35.	Joseph M. Cadbury, Philadelphia, Pa.	1,370
36.	Wm. H. Farrar, Zion, Ill.	1,355
37.	R. J. Middleton, Norristown, Pa.	1,275
38.	Johnson A. Neff, Denver, Colo.	1,270
39.	A. L. Wilk, Edmonton, Alta.	1,243
40.	Richard B. Fischer, Flushing, N. Y.	1,226
41.	S. H. Weakley, Ft. Smith, Ark.	1,224
42.	Dr. H. C. Gardenier, Montvale, N. J.	1,190
43.	Harry K. Hutter, Aberdeen, S. Dak.	1,190
44.	Frank W. Robl, Ellinwood, Kans.	1,189
45.	Dr. J. F. Brenckle, Mellette, S. Dak.	1,184
46.	Dr. Harold C. Burdick, Mayville, N. Dak.	1,172
47.	Albert W. Berrie, Gorham, Maine	1,167
48.	Henry P. Baily, Philadelphia, Pa.	1,106
49.	Vernon C. Rossman, Waukesha, Wisc.	1,097
50.	Dr. Alfred O. Gross, Brunswick, Maine	1,090
51.	Carlos Stannard, Phoenix, Ariz.	1,089
52.	Chas. O. Handley, Blacksburg, Va.	1,071
53.	Franklin G. Crawford, Palos Verdes Estates, Calif.	1,055
54.	C. J. Goetz, Cincinnati, Ohio	1,050
55.	Mr. and Mrs. Paul E. Downing, Highland Park, Ill.	1,049
56.	George W. Pyle, Berwyn, Pa.	1,042
57.	Howard W. Braun and Grover C. Keplinger, Jr., Canton, Ohio	1,037
58.	E. W. and G. C. Ehmann, Piedmont, Calif.	1,027
59.	H. F. and G. Wing, Jackson, Mich.	1,018
60.	Mahlon L. Wright, Sanford, Fla.	1,013
61.	W. E. Schantz, Columbus, Ohio.	1,005
62.	Oscar M. Root, North Andover, Mass.	1,004
63.	J. C. Dickinson, Gainesville, Fla.	1,000
64.	J. J. Storrow, Boston, Mass.	1,000
65.	Vasco M. Tanner, Provo, Utah	1,000

Cooperators banding between 800 and 1,000 birds:

1. Walter I. Allen, Altadena, Calif.
2. Mrs. N. Edw. Ayer, Pomona, Calif.
3. Wm. E. Brentzel, Fargo, N. Dak.
4. Dr. H. A. Burns, Ah-gwah-ching, Minn.
5. E. M. and W. M. Davis, Shirley, Mass.
6. C. V. and J. V. Duff, Hollywood, Calif.
7. Ross Federico, Quogue, N. Y.
8. Mrs. H. W. Gray, Wilton, N. Dak.
9. Capt. E. R. Guild, Glenwood Springs, Calif.
10. T. S. Hennessy, Ottawa, Ont.
11. C. E. Holcombe, Zion, Ill.
12. Lynn H. Hutchens, River Forest, Ill.
13. John H. Mayer, South Ozone Park, N. Y.
14. Paul H. Oppmann, Lakewood, Ohio
15. G. Hapgood Parks, Hartford, Conn.
16. H. D. Ruhl, Lansing, Mich.
17. Charles C. Vandervort, Laceyville, Pa.

Cooperators banding between 500 and 800 birds:

1. Wm. O. Astle, Flushing, N. Y.
2. Robert S. Bach, Seattle, Wash.
3. Donald D. Baldwin, Fessenden, N. Dak.
4. Fred G. Bard, Regina, Sask.
5. Mrs. Jos. T. Birchett, Tempe, Ariz.
6. Oscar M. Bryens, McMillan, Mich.
7. Herbert R. Buettner, Burlington, Iowa
8. Mrs. G. E. Burbank, Sandwich, Mass.
9. Frank M. Carroll, New Orleans, La.
10. Dr. Karl Christofferson, Blaney Park, Mich.
11. Albert E. Conway, Jr., West Chester, Pa.
12. Arthur Danks, Allamuchy, N. J.
13. W. M. Davidson, Beltsville, Md.
14. Harry T. Davis, Raleigh, N. C.
15. George Dock, Jr., Scarsdale, N. Y.
16. Dumont Banding Station, Pequannock, N. J.
17. Mr. and Mrs. H. H. Edwards, Claremont, Calif.
18. Prof. F. M. Erickson, Salem, Ore.
19. Prof. Allan C. Fraser, Ithaca, N. Y.
20. F. J. H. Fredeen, Macrorie, Sask.
21. Keahon Garland, Demarest, N. J.
22. Geoffrey Gill, Huntington, N. Y.
23. Earl W. Glandon, Stapleton, Nebr.
24. Dr. Geo. B. Happ, Elsah, Ill.
25. Harold M. Hill, Redlands, Calif.
26. Dr. H. B. Hitchcock, London, Ont.
27. Harold C. Jones, Mount Berry, Ga.
28. Allan D. Kirk, Wilkinsburg, Pa.
29. K. K. Kreag, Lansing, Mich.
30. Malcolm J. Lerch, Penn Yan, N. Y.
31. Malcolm McDonald, Fairfield, Iowa
32. Arthur B. Mickey, Laramie, Wyo.
33. Arthur D. Moore, South Haven, Mich.
34. Mr. and Mrs. C. P. Mounts, Cuyahoga Falls, Ohio
35. Dr. T. E. Musselman, Quincy, Ill.
36. Walter F. Nichols, Pasadena, Calif.
37. Theed Pearse, Courtenay, B. C.
38. Dr. Wm. Pepper, Philadelphia, Pa.
39. Mrs. C. E. Peterson, Madison, Minn.
40. Richard H. Pough, New York, N. Y.
41. Quebec Zoological Garden (by Raymond Cayouette), Charlesbourg, Que.
42. Dr. Geo. B. Saunders, Denver, Colo.
43. C. J. Spiker, Branchport, N. Y.
44. Prof. J. W. Stack, East Lansing, Mich.
45. Royal N. Stewart, Laurel, Md.
46. E. L. Sumner, Berkeley, Calif.
47. Lawrence Tyler, Parry Sound, Ont.
48. Robert E. Ware, Clemson College, S. C.
49. Virgil L. Weiser, Fessenden, N. Dak.
50. Chas. G. Wortz, Wilmington, Del.
51. Charles Yeomans, Winnetka, Ill.

Cooperators banding between 300 and 500 birds:

1. Dennis Ashby, Duncan, B. C.
2. Walter Baker, Ottumwa, Iowa
3. L. H. Barkhausen, Chicago, Ill.
4. F. T. Bashour, Hartford, Conn.
5. S. M. Batterson, Mohler, Ore.
6. George H. Beatty, Jr., Merion Station, Pa.
7. Carmen Beiming, Platteville, Wisc.
8. C. R. Berrey, Casper, Wyo.
9. Rev. G. C. M. Bierens, Fairmount, N. Dak.
10. Mrs. Florence K. Daley, Oliverea, N. Y.
11. Winthrop N. Davey, Jackson, Mich.
12. Dr. M. H. Finley, Winnetka, Ill.
13. Fred N. Gallup, Escondido, Calif.
14. James Gerow, Boise, Idaho
15. Mr. and Mrs. J. A. Gillespie, Glenolden, Pa.
16. Frank A. Godchaux, Jr., Abbeville, La.
17. Mr. and Mrs. O. J. Gromme, Milwaukee, Wisc.
18. Winston Guest, New York, N. Y.
19. Mr. and Mrs. LeRoy Gulotta, Lincoln, Nebr.
20. Edward P. Hamilton, Milton, Mass.
21. Moffitt Howell, Jacksonville, Fla.
22. Winn Jones, Columbus, Ohio
23. Eric C. Kinsey, Manor, Calif.
24. J. W. Kistler, Raleigh, N. C.
25. Richard G. Kuerzi, Myrtle Beach, S. C.
26. Henry C. Kyllingstad, Emrick, N. Dak.
27. Bert Lambert, Allenville, Mich.
28. George Lang, Cawston, B. C.
29. Mrs. Alice McAlister, Canaan, N. H.
30. Howard P. Mahnken, Brooklyn, N. Y.
31. Louis Martin, Springfield, Ill.
32. Edwin A. Mason, Groton, Mass.
33. F. W. Monro, Arvilla, Alta.
34. Mrs. Daisie M. Morrison, Gulfport, Fla.
35. N. C. Nash, Cambridge, Mass.
36. Walter P. Nickell, Bloomfield Hills, Mich.
37. L. C. Nielson, Battle Creek, Mich.
38. Dr. Allen M. Pearson, Auburn, Ala.
39. Mr. and Mrs. Wm. Pepper, Jr., Philadelphia, Pa.
40. James G. Peterson, Diablo, Calif.
41. Edward J. Reimann, Philadelphia, Pa.
42. C. Selwyn Rich, Alhambra, Calif.
43. C. T. Ridley, Norwood, Man.
44. Mrs. M. C. Sargent, La Jolla, Calif.
45. R. N. Saxton, Arlington, Va.
46. Theodore M. Sperry, Decatur, Ill.
47. Dr. Dayton Stoner, Albany, N. Y.
48. Chas. A. Stratton, Drexel Hill, Pa.
49. Prof. Louis A. Test, Lindsay, Calif.
50. Mrs. A. P. Thomas, Indianapolis, Ind.
51. Rev. H. W. Wager, Pierre, S. Dak.
52. Mrs. Kenneth B. Wetherbee, Worcester, Mass.
53. Mrs. Will Williams, Bakersfield, Calif.
54. James B. Young, Louisville, Ky.

Cooperators banding between 200 and 300 birds:

1. Ed. A. Adelberg, New Haven, Conn.
2. Bernard W. Baker, Marne, Mich.
3. Carleton A. Beckhart, Barrington, Ill.
4. Richard M. Bond, Santa Paula, Calif.
5. Dr. Donald J. Borror, Columbus, Ohio
6. Robert B. Brown, Gambier, Ohio
7. Prof. and Mrs. C. J. Campbell, Hanover, N. H.
8. Charles Carter, Fairfield, Iowa
9. Lowell E. Carter, Russiaville, Ind.
10. Geo. L. Cook, Bashaw, Alta.
11. Mrs. F. M. Cutler, Amherst, Mass.
12. Wendell Dahlberg, Chicago, Ill.
13. Mrs. F. L. DuMond, Grand Rapids, Mich.
14. Miss Constance Everett, Waseca, Minn.
15. Mrs. Cecilia D. Fielder, Katonah, N. Y.
16. Mr. and Mrs. F. E. Frei, Glasgow, Ky.
17. Dr. Paul C. Gatterdam, LaCrosse, Wisc.
18. H. A. Hochbaum, Madison, Wisc.
19. Geo. A. Ingham, Jr., Darby P. O., Pa.
20. Mrs. Esther L. Jackson, Ohio, Ill.
21. Mr. and Mrs. Clarence S. Jung, Milwaukee, Wisc.
22. George Kent, Holland, Mich.
23. Dr. Harrison F. Lewis, Ottawa, Ont.
24. Earl L. Loyster, Milwaukee, Wisc.
25. Edward McColgan, Catonsville, Md.
26. Mrs. Melva T. Maxson, Milton, Wisc.
27. Jesse V. Miller, Manhasset, N. Y.
28. Mrs. J. F. Nichols, Oakes, N. Dak.
29. Dr. H. F. Perkins, Burlington, Vt.
30. S. E. Perkins, III, Indianapolis, Ind.
31. James L. Peters, Harvard, Mass.
32. Maj. G. D. Robinson, St. Petersburg, Fla.
33. Prof. Wm. Rowan, Edmonton, Alta.
34. T. G. Scott, Ames, Iowa
35. Barton L. Sharp, Lititz, Pa.
36. Merit Skaggs, South Euclid, Ohio
37. Mrs. Otis H. Smith, San Anselmo, Calif.
38. Thomas Smith, Hamilton, Ont.
39. S. A. Thorn, Milwaukee, Wisc.
40. Alfred R. Tobey, Dublin, N. H.
41. Mrs. Wilson Tout, North Platte, Nebr.
42. A. D. Trempe, Sault Ste. Marie, Mich.
43. F. W. Trevor, Milbrook, N. Y.
44. Ray M. Verrill, Buffalo, N. Y.
45. Dr. L. H. Walkinshaw, Battle Creek, Mich.
46. Dr. Geo. J. Wallace, Lenox, Mass.
47. C. L. Whittle, Hancock, N. H.
48. S. W. Witmer, Goshen, Ind.
49. Geo. S. Wolfram, Canal Winchester, Ohio
50. Dr. Harold B. Wood, Harrisburg, Pa.
51. Dr. C. B. Worth, Swarthmore, Pa.

Cooperators banding between 100 and 200 birds:

1. Waldo G. Abbott, Santa Barbara, Calif.
2. Edward Addy, Blacksburg, Va

3. Robert Allison, Athol, Mass.
4. Mrs. Effie A. Anthony, Bar Harbor, Maine
5. Brasher C. Bacon, Madisonville, Ky.
6. Rev. J. W. Baechle, Collegeville, Ind.
7. Walt Batezel, Sewell, N. J.
8. Mrs. F. L. Battell, Ames, Iowa
9. Mr. and Mrs. F. M. Baumgartner, Stillwater, Okla.
10. Beecher Beery, Pleasant Hill, Ohio
11. Edward Berlett, Plattsmouth, Nebr.
12. J. M. Bradley, Weston, Mass.
13. L. M. Butler, St. Paul, Minn.
14. Louis W. Campbell, Toledo, Ohio
15. Wm. F. Cantrell, Athens, Ga.
16. T. Donald Carter, Boonton, N. J.
17. Dr. Floyd B. Chapman, Boston, Mass.
18. Lawrence B. Chapman, Wellesley, Mass.
19. E. D. Clabaugh, Berkeley, Calif.
20. Albert E. Clattenburg, Jr., Washington, D. C.
21. Miss Marion Clow, Lake Forest, Ill.
22. A. D. Cook, Lakeside, Mich.
23. James Cosby, Jr., Buffalo, N. Y.
24. Compton Crook, Towson, Md.
25. Miss Elizabeth L. Curtis, Seattle, Wash.
26. Fred Curtis, Redfield, S. Dak.
27. W. W. Demeritt, Key West, Fla.
28. Dr. Mary M. Erickson, Santa Barbara, Calif.
29. Demase Fleury, Quebec, Que.
30. Maynard Fosberg, Turlock, Calif.
31. Frank B. Foster, Phoenixville, Pa.
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33. Raymond T. Fuller, Winterton, N. Y.
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44. Paul W. Hoffmann, Wauwatosa, Wisc.
45. Mr. and Mrs. J. N. Hough, Columbus, Ohio
46. Wallace B. Houston, East Stroudsburg, Pa.
47. Joseph C. Howell, Stillwater, Okla.
48. L. E. Hunter, Hanna City, Ill.
49. Harold L. Hutchins, Hamden, Conn.
50. Mrs. O. F. Jensen, Chapel Hill, N. C.
51. S. C. Kendeigh, Champaign, Ill.
52. Robert N. Lake, Wilton, N. H.
53. Wm. H. Lawrence, Washington, D. C.
54. Robt. J. Livingston, Oswego, Ore.
55. Mrs. Olivia H. Logan, Camden, Ohio

56. Wm. W. Lott, London, Ont.
57. C. H. Luke, Edmonton, Alta.
58. Wm. McIntosh, Jr., Panama City, Fla.
59. Mr. and Mrs. R. R. McMath, Pontiac, Mich.
60. Mrs. R. T. Mack, Highland Park, Ill.
61. Wm. E. Mack, Heraldsburg, Calif.
62. Frank W. Mead, Columbus, Ohio
63. W. A. Morris, London, Ont.
64. Joseph R. Morton, Winnipeg, Man.
65. Sidney Mulberry, Winnipeg, Man.
66. Russell T. Norris, Butler, Pa.
67. Charles O'Brien, Mundelein, Ill.
68. Eugene P. Odum, Athens, Ga.
69. Mrs. L. B. Payne, Santa Cruz, Calif.
70. Carl A. A. Pedersen, Woodcliff Lake, N. J.
71. Harry C. Pegg, Glenevis, Alta.
72. Harold S. Peters, Charleston, S. C.
73. Dr. M. D. Pirnie, Battle Creek, Mich.
74. D. I. Rasmussen, Logan, Utah
75. Mrs. Henry Rice, Jr., Logandale, Nev.
76. R. C. Richards, Berwyn, Pa.
77. Carl Richardson, Klamath Falls, Ore.
78. Mr. and Mrs. L. G. Scott, Mt. Pleasant, Tenn.
79. Milton L. Seibert, Oakland, Calif.
80. Mrs. F. Sherwin, Willoughby, Ohio
81. Mr. and Mrs. Edward Siddall, Malvern, Pa.
82. Wendell P. Smith, Wells River, Vt.
83. Miss Edna M. Stevens, Blue Rapids, Kans.
84. Paul A. Stewart, Leetonia, Ohio
85. Ralph H. Sunderman, St. Louis, Mo.
86. Estes Suter, Hot Springs, S. Dak.
87. Wm. A. Taylor, Sharon, Mass.
88. Chester A. Thomas, Santa Fe, N. Mex.
89. Mrs. E. E. Thompson, Indianapolis, Ind.
90. Mrs. John A. Thompson, Minneapolis, Minn.
91. H. O. Todd, Jr., Murfreesboro, Tenn.
92. Robert K. Ungemah, White Plains, N. J.
93. Prof. George Wagner, Madison, Wisc.
94. Chas. F. Walker, Put-in-Bay, Ohio
95. Mrs. H. H. Ward, Palo Alto, Calif.
96. Mrs. Frank Warner, Columbus, Ohio
97. Mrs. John A. Webb, Avon, Mass.
98. Wm. G. Webb, Eagle Rock, Calif.
199. E. C. Weeks, Sanbornton, N. H.
100. Oliver N. Wells, Sardis, B. C.
101. Cleo Wesner, Campbellsburg, Ind.
102. F. J. B. Williams, Portage la Prairie, Man.
103. Harold C. Wilson, Ephraim, Wisc.
104. J. H. Wright, III, Cornwells Heights, Pa.
105. Mrs. Ruth J. Wright, Randolph, Mass.
106. Chas. A. Ziebarth, Wilmette, Ill.

The following stations on Federal refuges banded more than 100 birds:

1. Piedmont National Wildlife Refuge, Round Oak, Ga..... 13,654
   Raymond J. Fleetwood
2. Chautauqua National Wildlife Refuge, Havana, Ill..... 6,305
   J. M. Anderson
3. Lake Malheur National Wildlife Refuge, Burns, Ore..... 4,252
   G. M. Benson
4. Lower Souris National Wildlife Refuge, Upham, N. Dak..... 3,837
   C. J. Henry
5. Bear River Migratory Bird Refuge, Brigham, Utah..... 3,536
   V. T. Wilson
6. Sand Lake National Wildlife Refuge, Columbia, S. Dak..... 3,121
   W. E. Beed
7. Des Lacs National Wildlife Refuge, Kenmare, N. Dak..... 1,135
   Seth H. Low
8. Medicine Lake National Wildlife Refuge, Medicine Lake, Mont.... 1,047
   T. C. Horn
9. Squaw Creek National Wildlife Refuge, Forest City, Mo..... 931
   P. L. DePuy and Henry Munkres
10. Seney National Wildlife Refuge, Germfask, Mich..... 886
    J. H. Steenis and C. W. Johnson
11. Waubay National Wildlife Refuge, Waubay, S. Dak..... 853
    D. R. Ambrosen
12. Cape Romain National Wildlife Refuge, McClellanville, S. C..... 781
    A. H. DuPre
13. Lake Bowdoin National Wildlife Refuge, Malta, Mont..... 772
    B. M. Hazeltine
14. Lake Mattamuskeet National Wildlife Refuge, New Holland, N. C... 669
    M. S. Johnson
15. Upper Souris National Wildlife Refuge, Foxholm, N. D..... 598
    F. S. Dart
16. Sacramento National Wildlife Refuge, Willows, Calif..... 545
    P. J. Van Huizen
17. Wheeler National Wildlife Refuge, Decatur, Ala..... 280
    G. E. Frye
18. Necedah National Wildlife Refuge, Necedah, Wisc..... 260
    Burns T. Carter
19. Lacassine National Wildlife Refuge, Lake Arthur, La..... 257
    Earl L. Atwood
20. Tule Lake National Wildlife Refuge, Tulelake, Calif..... 243
    C. G. Fairchild
21. Back Bay National Wildlife Refuge, Pungo, Va..... 233
    H. A. Bailey
22. Carolina Sandhills National Wildlife Refuge, McBee, S. C..... 231
    W. F. Hopkins
23. Lacreek National Wildlife Refuge, Martin, S. Dak..... 175
    E. W. Craven
24. St. Marks National Wildlife Refuge, St. Marks, Fla..... 128
    Donald V. Gray
25. Wichita Mountains Wildlife Refuge, Cache, Okla..... 121
    F. B. McMurray and C. H. Rouse

ANNOUNCEMENTS

All banders are urged to go over their files and notes to see if they cannot uncover material for both body articles and general notes for BIRD-BANDING. Your journal has reached a critical state in its existence: ornithological activity is being curtailed for many reasons, many active workers are being drawn into war efforts, the output of literature is falling off all along the line, hence fewer reviews. Consequently a greater volume of articles and notes is required to make up the deficiency of "Recent Literature" if BIRD-BANDING is to maintain its forty pages per issue or even continue publication at all.

Due to the necessity for conserving rubber and gasoline, the regional field meetings announced in the January issue of BIRD-BANDING have been cancelled.

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A Journal of Ornithological Investigation

(Published Quarterly)

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*Died April 7, 1942.